PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Appl. No.	:	09/441,119	Confirmation No.: 3874
Applicant	:	Oliver L. Richards et al.	
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August 19, 2005
Date of Signature and Mail Deposit

By: _____
Kermit Robinson
Reg. No. 48,734

APPEAL BRIEF UNDER 37 C.F.R. 41.37

MS Appeal Brief-Patents
Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

In response to the final Official Action dated April 20, 2005, which finally rejected Claims 1-14 in the above-identified application, please consider the arguments set forth below

Claims currently in the application are provided as an attachment A1 hereto.

Table of Authorities

The following authorities are provided as attachments hereto:

A2. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed Cir 1991)

A3. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed Cir. 1990)

A4. In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed Cir. 1992)

A5. In re John R. Beattie, 974 F.2d 1309, 24 USPQ2d 1040 (U.S. App.; 1992)

A6. In re Ratti, 270 F.2d 810, 123 USPQ 349 (C.C.P.A. 1959)

A7. In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)

Real Party in Interest

ALLEGRO MICROSYSTEMS, INC., a Delaware corporation having a place of business at 115 Northeast Cutoff, Worcester, MA 01615 is the real party in interest by way of an assignment executed on December 3, 1999 by the inventors and recorded on reel 010590, frame 0163 on January 24, 2000.

Related Appeals and Interferences

None

Status of the Claims

Claims 1-14 remain rejected. Claims 1-14 are appealed.

More particularly, Claims 1-11 are rejected as being anticipated by "LNBP10 Series LNBP20" datasheet (hereinafter "the LNBP10 reference") in view of Vizer (U.S. Patent No. 5,893,023, hereinafter "Vizer"). Dependent claims 12-14 are rejected as being obvious over a combination of the LNBP10 reference, Vizer, and further in view of Mammano et al. (U.S. Patent No. 5,411,562).

Status of Amendments Filed After Final Rejection

No amendments were filed after final rejection. Applicants appealed on June 20, 2005 from the final Office Action dated April 20, 2005.

Summary of Claimed Subject Matter

The present invention is directed to a circuit and associated method for providing a power and control signal, which has a plurality of selectable DC voltage levels, and which is modulated by an analog AC tone signal, to satellite receiver apparatus on a single conductor. In some embodiments, the satellite receiver apparatus includes a low noise block converter (LNB).

Referring to Figure 2 of the present application, and using reference designators like those thereupon, independent apparatus Claim 1 provides a circuit 30 for providing a power and control signal (LNB), which has a DC level selected from a plurality of DC voltage levels, and which is modulated by an analog AC tone signal, to satellite receiver apparatus on a single conductor 18. The claimed circuit 30 includes *a switch-mode power supply* 50 having an input port 52a to which an input voltage (Vin) is applied, a feedback port 52b responsive to a reference voltage (Vref), which is indicative of the selected DC voltage level, and an output port 52c at which a regulated output voltage (Vbulk) is provided. The regulated output voltage (Vbulk) is greater than the selected DC voltage level by a predetermined amount. The claimed circuit 30 also includes *a linear amplifier* 56 having an input port 58a coupled to the output port 52c of the switch-mode power supply 50, a control port 58b to which the reference voltage (Vref), which is indicative of the selected DC voltage level, is applied, and an output port 58c at which an output voltage (LNB) having the selected DC voltage level and, which is modulated by the analog AC tone signal, is provided."

Again referring to Figure 2 of the present application, and using reference designators like those thereupon, independent method Claim 7 provides a method for providing a power and control signal (LNB), which has a DC level selected from a plurality of DC voltage levels, and which is modulated by an analog AC tone signal, to satellite receiver apparatus on a single conductor 18. The method includes the steps of: *selecting one of the plurality of DC voltage levels; providing a regulated output voltage (Vbulk) with a switch-mode power supply*, the regulated output voltage (Vbulk) having a voltage level greater than the selected DC voltage level by a predetermined amount; and *applying the regulated output voltage (Vbulk) to a linear*

amplifier 56. The linear amplifier 56 provides an output voltage (LNB) having the selected DC voltage level and being modulated by the analog AC tone signal.

Yet again referring to Figure 2 of the present application, and using reference designators like those thereupon, independent apparatus Claim 11 provides a circuit 30 for providing a power and control signal, which has a DC level selected from a plurality of DC voltage levels, and which is modulated by an analog AC tone signal, to a low noise block converter of a satellite television system on a single coaxial cable 18. The claimed circuit 30 includes *a switch-mode power supply* 50 having an input port 52a to which an input voltage (Vin) is applied, a feedback port 52b to which a reference voltage (Vref) indicative of the reference voltage (Vref) level is applied, and an output port 52c at which a regulated output voltage (Vbulk) is provided. The regulated output voltage (Vbulk) is greater than the selected DC voltage level by a predetermined amount. The claimed circuit 30 also includes *a linear amplifier* 56 having an input port 58a coupled to the output port 52c of the switch-mode power supply 50, a control port 58b to which the reference voltage (Vref), which is indicative of the selected DC voltage level, is applied, and an output port 58c at which an output voltage (LNB) having the selected DC voltage level is provided. The claimed circuit 30 also includes *a signal generator* 68 for generating the analog AC tone signal and for applying the analog AC tone signal to the linear amplifier 56. The output voltage (LNB) of the linear amplifier 56 is modulated by the analog AC tone signal.

Thus, the output signal (LNB) at the output port 58c of the linear amplifier 56 has a selectable DC voltage, which is modulated by an AC tone signal. Different selected DC voltage levels can correspond to logic one and logic zero.

Referring now to Figure 1, the satellite receiver apparatus to which the output signal (LNB) is sent can be a low noise block converter 34, of a satellite television system 10. Satellite television receivers (e.g., 10) generally include a low noise block (LNB) converter 34 at the satellite dish 14 for controlling reception of satellite television signals. Functions of the LNB converter 34 include downconverting received satellite signals, changing the frequency band of signal reception, changing the signal polarization of reception and, in some

applications, controlling more than one receive antenna. For these purposes, the LNB converter requires control signals and power, both of which are provided by circuitry 30, 24 housed in the box at the television set through which a user can change the channel of reception (sometimes referred to as the "set top box" 16). Since only a single coaxial cable 18 couples the LNB converter 34 to the set top box 16, the control and power signals are carried by a single coaxial cable 18.

Eutelsat, a European organization, which governs television satellite communications, establishes specifications for the LNB converter control and power signals. Analog AC tone control signals are provided by a 22kHz, 600mV peak-to-peak signal, which can be used to implement DiSEqC™ (Digital Satellite Equipment Control) encoding for the purpose of changing the polarization and frequency band of received RF signals. Digital control information which is also used to change the frequency band of received RF signals is transmitted as a nominal 13 volt DC signal for a logic zero and as a nominal 18 volt DC signal for a logic one. In practice however, a logic zero corresponds more broadly to voltages between approximately 12-14 volts and a logic one corresponds to voltages between approximately 17-20 volts. Power to the LNB converter circuitry itself is provided by whatever DC voltage is being used to transmit digital control information at any given time. Further, the LNB converter circuitry requires on the order of 0.6 amp of current.

Referring again to Figure 2, the present invention achieves high power efficiency by way of the claimed switch-mode power supply 50 and also by way of the claimed predetermined amount by which the regulated output voltage (Vbulk) of the switch-mode power supply 50 is greater than the selected DC voltage level at the output node 58c of the linear amplifier 56.

More particularly, with the claimed arrangement, the voltage dropped across the linear amplifier 56 is minimized since a supply voltage (Vbulk) to the linear amplifier is maintained at a predetermined voltage greater than, but close to, the amplifier's output voltage. For example, the supply voltage at the node 58a of the linear power amplifier 56 is maintained at a

predetermined voltage greater than, but close to, the amplifier's output voltage at the node 58c. This arrangement results in reduced power consumption by the power amplifier 56.

In order to achieve the predetermined voltage greater than, but close to, the amplifier's output voltage even when the output voltage of the switched-mode power supply 50 is changed, a reference voltage (Vref) is applied both to the switched-mode power supply node 52b and to an input node 58b of a linear amplifier 56. Furthermore, switch-mode power supplies generally provide high efficiency.

The resulting high efficiency and corresponding low power dissipation permit the claimed satellite receiver apparatus, in some embodiments, to be provided in the form of a monolithic integrated circuit having relatively small package dimensions, since heat sinking requirements are reduced.

Grounds of Rejections to Be Reviewed On Appeal

Issues presented for appeal include the following:

1. Whether Claims 1-11 are unpatentable under 35 U.S.C. 103(a) as being obvious over the LNBP10 reference in view of Vizer.

2. Whether Claims 12-14 are unpatentable under 35 U.S.C. 103(a) as being obvious over the LNBP10 reference in view of Vizer and Mammano et al. is not discussed. Claims 12-14 stand or fall with Claim 11 as recited below.

Grouping of Claims

Claims 1-6 stand or fall together. Claims 7-10 stand or fall together. Claims 11-14 stand or fall together.

Arguments

A. Claim 1 is not obvious over the LNBP10 reference whether taken alone or in combination with Vizer.

Claim 1 is an apparatus claim, reciting "...a switch-mode power supply having an input port to which an input voltage is applied, a feedback port responsive to a reference voltage indicative of said selected DC voltage level, and an output port at which a regulated output voltage is provided, wherein said regulated output voltage is greater than said selected DC voltage level by a predetermined amount; and a linear amplifier having an input port coupled to said output port of said switch-mode power supply, a control port to which said reference voltage indicative of said selected DC voltage level is applied, and an output port at which an output voltage having the selected DC voltage level and being modulated by the analog AC tone signal is provided."

1. There is no motivation to combine the LNBP10 reference with Vizer, as suggested by the Examiner.

As found in MPEP §2142, in order to establish a prima facie case of obviousness "...there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." (See e.g., In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed Cir 1991). In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed Cir. 1990) and In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed Cir. 1992)). Applicants respectfully submit that the Examiner has not met this burden in order to establish prima facie obviousness.

As described above, the present invention achieves high power efficiency by way of the claimed switch-mode power supply and by way of the claimed predetermined amount by which the regulated output voltage of the switch-mode power supply is greater than the selected DC voltage level at the linear amplifier output node.

As also described above, with the claimed arrangement, the voltage dropped across the linear amplifier is minimized since an input voltage to the linear amplifier is maintained at a predetermined voltage greater than, but close to, the amplifier's output voltage. Referring, for example, to Figure 2, the input voltage at the node 58a of the linear power amplifier 56 is

maintained at a predetermined voltage greater than, but close to, the amplifier's output voltage at the node 58c.

In order to achieve the predetermined voltage greater than, but close to, the amplifier's output voltage even when the output voltage of the switched-mode power supply is changed, referring again to Figure 2, a reference voltage (Vref) is applied both to the switched-mode power supply node 52b and to an input node 58b of a linear amplifier 56 as claimed. Furthermore, switch-mode power supplies generally provide high efficiency.

In contrast, the LNBP10 reference attempts to achieve a high efficiency, but in an ***entirely*** different way than the present invention.

The Examiner relies on the LNBP10 reference as teaching the use of a linear amplifier in an "LNB supply and control voltage regulator" (title) circuit and relies on Vizer as teaching the use of a switch-mode power supply in a receiver. The Examiner concludes that "[i]t would have been obvious to modify the LNBP10 circuit in view of Vizer's teachings to include a switch mode power supply in order to provide different operating voltages from *a single DC voltage source*, where the input of the switch mode power supply is connected to the single supply voltage source, and the control input of the switch mode power supply is coupled to VSEL, in order to regulate the output delivered to the linear amplifier means. The motivation would be to modify the LNBP10 circuit so it uses only *one source* with reduced power dissipation at the receiver, as taught by Vizer." (Office Action dated July 7, 2004, pages 3 and 4). [emphasis added]

As described in Applicant's Background of the Invention section, the LNBP10 reference describes the "LNB supply and control voltage regulator" circuit comprising a linear amplifier to which power can be supplied from one of two voltage sources depending on the desired output voltage, in order to reduce the power dissipation in the linear amplifier. Essentially, when a lower output voltage from the LNBP10 device is selected, a second voltage source having lower voltage is also selected, resulting in a reduced voltage drop across the linear amplifier from that which would be achieved if only one voltage source having a higher

voltage were used. Thus, the LNBP10 reference provides a *particular* solution for reducing power dissipation in the linear amplifier.

As mentioned above, the LNBP10 reference attempts to achieve a high efficiency, but in an entirely different way than the present invention, by the use of two supply input pins, Vcc1 and Vcc2, coupled to two voltage sources, respectively, each providing a different voltage. In essence, the LNBP10 reference teaches one way to achieve high efficiency and the present invention teaches another. As a result, one of ordinary skill in the art seeking to solve the problem solved by Applicants (namely, of reducing power dissipation in a linear amplifier that provides power and control signals to an LNB converter) and considering the LNBP10 teaching, would not be motivated to look further for another and different power reduction solution.

Vizer does not provide the lacking motivation to combine the references in the suggested manner. Vizer teaches the use of a switch-mode power supply in a satellite receiver. The power supply is capable of providing different operating voltages in response to different duty cycles set by a microprocessor in order to permit the receiver to be connected to different antenna assemblies that require different operating voltages. (see Abstract) However, Vizer does not contemplate using a switch-mode power supply to provide a regulated input voltage to a linear amplifier, which linear amplifier provides an output voltage having the selected DC voltage level and being modulated by an analog AC tone signal, as claimed. Notably, Vizer does not seek to provide an output voltage comparable to the claimed output voltage having the selected DC voltage level and being modulated by the analog AC tone signal. Thus, one of ordinary skill in the art considering Vizer would not be motivated to use a linear amplifier at all, since to do so would be redundant for Vizer's purpose.

Applicants further submit that the LNBP10 reference would not necessarily benefit by combination with Vizer, and thus, one of ordinary skill in the art seeking to solve the problem solved by the present invention and considering the LNBP10 teaching would be even less motivated to look for another and different power reduction solution. Applicants suggest, for example, that a switched-mode power supply as in Vizer is more complex than a linear power

supply used by the LNBP10 reference, and also requires the use of magnetic elements. Furthermore, in some satellite systems, one or both of the two linear voltage sources used by the LNBP10 reference might already be present for other purposes, and therefore, addition of a switch-mode power supply as in Vizer might add size and cost.

Applicants further submit that the specific combination suggested by the Examiner is not a combination that would result from the LNBP10 reference being combined with Vizer. The Examiner asserts that "[i]t would have been obvious to modify the LNBP10 circuit in view of Vizer's teachings to include a switch mode power supply in order to provide different operating voltage from *a single DC voltage source*..." [emphasis added] In contrast, Applicants submit that if the LNBP10 reference were to be combined with Vizer, the resulting arrangement would retain the two supply input pins Vcc1 and Vcc2 of the LNBP10 reference, since otherwise, the intended function of the reference; namely, of providing two selectable input voltage sources would be destroyed. Thus a combination of the LNBP10 and Vizer references would result in the use of two supply input pins Vcc1 and Vcc2 to which two separate switch mode power supplies of Vizer would be coupled. Applicants submit that one of ordinary skill in the art would be even less motivated to make this particular combination due to resulting increased size and cost.

2. The LNBP10 reference teaches away from a combination of the LNBP10 reference and Vizer suggested by the Examiner.

In order to establish a prima facie case of obviousness, the references cannot teach away from a combination suggested by the Examiner. (See e.g., In re John R. Beattie, 974 F.2d 1309, 24 USPQ2d 1040 (U.S. App.; 1992) and In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)).

Applicants submit that the LNBP10 reference teaches away from the combination of the references suggested by the Examiner in its teaching of using two, selectable, input voltages as a way to reduce power dissipation in the linear amplifier. As described above, the LNBP10 reference attempts to achieve a high efficiency, but in an *entirely* different way than the present

invention. Therefore, by providing a suitable alternate solution, the LNBP10 reference teaches away from the solution provided by the present invention.

3. The combination of the LNBP10 reference and Vizer as suggested by the Examiner would destroy the intended function of the LNBP10 reference.

As found in MPEP §2143.01, in order to establish a prima facie case of obviousness "...[i]f the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious." (See e.g., In re Ratti, 270 F.2d 810, 123 USPQ 349 (C.C.P.A. 1959)).

Applicants submit that, to modify the LNBP10 teaching in the manner suggested by the Examiner "so it uses only one source," would not only change the principle of operation of, but would also *destroy the intended function* of, the LNBP10 reference. The LNBP10 reference provides two selectable input voltage sources as a mechanism for minimizing power dissipation in the linear amplifier. Applicants submit that, in the combination suggested by the Examiner, which has one power supply rather then two as required by the LNBP10 reference, the second of two supply input pins, Vcc1 and Vcc2, of the LNBP10 reference, and associated circuits that switch between the two supply input pins, would have no function at all. In the combination suggested by the Examiner, one of the two supply input pins Vcc1, Vcc2 would be entirely unconnected. Therefore, the intended function of the second power supply pin would be destroyed, and thus, the means by which the LNBP10 reference achieves reduced power consumption would be entirely destroyed.

In fact, with the combination suggested by the Examiner, the unused one of the two power supply pin Vcc1, Vcc2 and associated switching circuitry of the LNBP10 reference would add size and cost, and therefore, one of ordinary skill in the art would tend to eliminate them altogether, fully destroying their function.

B. Claim 7 is not obvious over the LNBP10 reference whether taken alone or in combination with Vizer.

Claim 7 is a method claim, reciting "...*selecting one of said plurality of DC voltage levels; providing a regulated output voltage* with a switch-mode power supply, said regulated output voltage having a voltage level greater than said selected DC voltage level by a predetermined amount; and *applying said regulated output voltage to a linear amplifier*, said linear amplifier providing an output voltage having said selected DC voltage level and being modulated by said analog AC tone signal."

The arguments set forth above in conjunction with Claim 1 also apply to Claim 7. Thus, Claim 7 is not discussed further.

C. Claim 11 is not obvious over the LNBP10 reference whether taken alone or in combination with Vizer.

Claim 11 is an apparatus claims, reciting "*a switch-mode power supply* having an input port to which an input voltage is applied, a feedback port to which a reference voltage indicative of said reference voltage level is applied, and an output port at which a regulated output voltage is provided, wherein said regulated output voltage is greater than said selected DC voltage level by a predetermined amount; *a linear amplifier* having an input port coupled to said output port of said switch-mode power supply, a control port to which said reference voltage indicative of said selected DC voltage level is applied, and an output port at which an output voltage having the selected DC voltage level is provided; and *a signal generator* for generating said analog AC tone signal and for applying said analog AC tone signal to said linear amplifier, wherein said output voltage of said linear amplifier is modulated by said analog AC tone signal.

Claim 11 is similar to Claim 1, but includes a signal generator. The same arguments set forth above in conjunction with Claim 1 also apply to Claim 11. Thus, Claim 11 is not discussed further.

Conclusion

Claims 2-6 depend from and thus include the limitations of Claim 1. Claims 8-10 depend from and thus include the limitations of Claim 7. Claims 12-14 depend from and thus include the limitations of Claim 11. Thus, Applicants submit that Claims 2-6, 8-10, and 12-14 are patentably distinct over the cited references at least for the reasons discussed above in conjunction with Claim 1, 7, and 11.

In view of the above, Applicants submit that Claims 1-14 and the entire case are in condition for allowance and should be sent to issue and such action is respectfully requested.

The Assistant Commissioner is hereby authorized to charge payment of any additional fees associated with this communication or credit any overpayment to Deposit Account No. 500845, including but not limited to, any charges for extensions of time under 37 C.F.R. §1.136.

Respectfully submitted,

Dated: August 19, 2005

DALY, CROWLEY, MOFFORD & DURKEE, LLP

By: _____

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Attachments:

A1. Claims currently in the application

A2. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed Cir 1991)

A3. In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed Cir. 1990)

A4. In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed Cir. 1992)

A5. In re John R. Beattie, 974 F.2d 1309, 24 USPQ2d 1040 (U.S. App.; 1992)

A6. In re Ratti, 270 F.2d 810, 123 USPQ 349 (C.C.P.A. 1959)

A7. In re Grasselli, 713 F.2d 731, 743, 218 USPQ 769, 779 (Fed. Cir. 1983)

A1: Claims Currently in the Application

1. (Original) A circuit for providing a power and control signal selected from a plurality of DC voltage levels and being modulated by an analog AC tone signal to satellite receiver apparatus on a single conductor, comprising:

a switch-mode power supply having an input port to which an input voltage is applied, a feedback port responsive to a reference voltage indicative of said selected DC voltage level, and an output port at which a regulated output voltage is provided, wherein said regulated output voltage is greater than said selected DC voltage level by a predetermined amount; and

a linear amplifier having an input port coupled to said output port of said switch-mode power supply, a control port to which said reference voltage indicative of said selected DC voltage level is applied, and an output port at which an output voltage having the selected DC voltage level and being modulated by the analog AC tone signal is provided.

2. (Original) The circuit of claim 1 wherein said satellite receiver apparatus comprises a low noise block converter of a satellite television system.

3. (Original) The circuit of claim 1 further comprising a signal generator for generating said analog AC tone signal and for applying said analog AC tone signal to said linear amplifier.

4. (Original) The circuit of claim 1 wherein said switch-mode power supply is a buck converter.

5. (Original) The circuit of claim 1 wherein said switch-mode power supply is a boost converter.

6. (Original) The circuit of claim 1 wherein said output port of said linear amplifier comprises a first output port portion and a second output port portion and wherein said output voltage of said linear amplifier is provided at a selected one of said first and second output port portions in response to an output port control signal.

7. (Original) A method for providing a power and control signal selected from a plurality of DC voltage levels and being modulated by an analog AC tone signal to satellite receiver apparatus on a single conductor, comprising the steps of:

selecting one of said plurality of DC voltage levels;

providing a regulated output voltage with a switch-mode power supply, said regulated output voltage having a voltage level greater than said selected DC voltage level by a predetermined amount; and

applying said regulated output voltage to a linear amplifier, said linear amplifier providing an output voltage having said selected DC voltage level and being modulated by said analog AC tone signal.

8. (Original) The method of claim 7 further comprising the step of providing said output voltage of said linear amplifier to a low noise block converter of a satellite television system.

9. (Original) The method of claim 7 further comprising the steps of:

generating said analog AC tone signal; and

applying said analog AC tone signal to said linear amplifier.

10. (Original) The method of claim 7 wherein said linear amplifier provides said output voltage at a selected one of a plurality of output ports.

11. (Previously Presented) A circuit for providing a power and control signal selected from a plurality of DC voltage levels and being modulated by an analog AC tone signal to a low noise block converter of a satellite television system on a single coaxial cable, comprising:

a switch-mode power supply having an input port to which an input voltage is applied, a feedback port to which a reference voltage indicative of said reference voltage level is applied, and an output port at which a regulated output voltage is provided, wherein said regulated output voltage is greater than said selected DC voltage level by a predetermined amount;

a linear amplifier having an input port coupled to said output port of said switch-mode power supply, a control port to which said reference voltage indicative of said selected DC

voltage level is applied, and an output port at which an output voltage having the selected DC voltage level is provided; and

a signal generator for generating said analog AC tone signal and for applying said analog AC tone signal to said linear amplifier, wherein said output voltage of said linear amplifier is modulated by said analog AC tone signal.

12. (Original) The circuit of claim 11 wherein said switch-mode power supply comprises:

an error amplifier having a first input responsive to said reference voltage, a second, feedback input, and an output at which an error signal is provided;

a pulse-width-modulation comparator responsive to said error signal for providing a transistor drive signal;

a transistor having a first terminal to which said input voltage is applied, a second terminal, and a control terminal responsive to said transistor drive signal; and

an inductor having a first terminal coupled to said second terminal of said transistor and a second terminal at which said output voltage of said linear amplifier is provided, wherein said output voltage is coupled to said feedback input of said error amplifier.

13. (Original) The circuit of claim 12 further comprising an offset voltage generator coupled between said reference voltage and said first input of said error amplifier.

14. (Previously Presented) The circuit of claim 12 wherein said error amplifier and said pulse-width-modulation comparator comprise a current mode pulse-width-modulation controller.

LEXSEE 947 F.2D 488

IN RE MARK A. VAECK, WIPA CHUNGJATUPORNCHAI and LEE MCINTOSH

No. 91-1120

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

947 F.2d 488; 1991 U.S. App. LEXIS 24846; 20 U.S.P.Q.2D (BNA) 1438

October 21, 1991, Decided

PRIOR HISTORY: [**1] Appealed from: United States Patent and Trademark Office Board of Patent Appeals and Interferences.

DISPOSITION:

Affirmed in Part, Reversed in Part.

CASE SUMMARY:

PROCEDURAL POSTURE: Appellant inventors sought review of a decision of the United States Patent and Trademark Office Board of Patent Appeals and Interferences, which rejected their claims as unpatentable under 35 U.S.C.S. § 103 and 35 U.S.C.S. § 112 because their invention was prima facie obvious and disclosure was not enabling.

OVERVIEW: The inventors sought review of the rejection of their patent claims under 35 U.S.C.S. § 103 and 35 U.S.C.S. § 112, as prima facie obvious, and not enabling, in their application for a genetic engineering technique for the production of insecticidal proteins. The Board of Patent Appeals applied eleven prior art references against the claims. The court reversed the rejection based on obviousness for failure to a establish prima facie case because prior art offered no suggestion of substitution that was different between the claimed invention and prior art and a reasonable expectation of success was not present. The court affirmed the rejection based on enablement, holding that there was no reasonable correlation between the narrow disclosure in the specification and the broad scope of protection sought because the disclosure did not enable one of ordinary skill to make and use the invention as recited in the claims without undue experimentation.

OUTCOME: The rejection of the inventors' claims for obviousness was reversed because suggestion and reasonable expectation of success was not present in the prior art. The rejection based on enablement was affirmed because disclosure did not enable one of ordinary skill to make and use the invention without undue experimentation.

LexisNexis(R) Headnotes

Patent Law > Nonobviousness > Evidence & Procedure > Prima Facie Obviousness
Patent Law > Jurisdiction & Review > Standards of Review > General Overview
Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN1] Obviousness, within the meaning of 35 U.S.C.S. § 103, is a legal question which the court independently reviews, though based upon underlying factual findings which the court reviews under the clearly erroneous standard.

Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN2] Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under 35 U.S.C.S. § 103 requires, inter alia, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have

revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure.

Patent Law > Claims & Specifications > Enablement Requirement > Standards & Tests

[HN3] The first paragraph of 35 U.S.C.S. § 112 requires, inter alia, that the specification of a patent enable any person skilled in the art to which it pertains to make and use the claimed invention. Although the statute does not say so, enablement requires that the specification teach those in the art to make and use the invention without undue experimentation. That some experimentation may be required is not fatal; the issue is whether the amount of experimentation required is undue.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview
Patent Law > Jurisdiction & Review > Standards of Review > General Overview

[HN4] Enablement is a question of law, which the court independently reviews, although based upon underlying factual findings, which the court reviews for clear error.

Patent Law > Claims & Specifications > Enablement Requirement > General Overview
Patent Law > Claims & Specifications > Description Requirement > General Overview
Patent Law > U.S. Patent & Trademark Office Proceedings > Filing Requirements > General Overview

[HN5] Patent applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. However, there must be sufficient disclosure, either through illustrative examples or terminology, to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed. The disclosure must adequately guide the art worker to determine, without undue experimentation, which species among all those encompassed by the claimed genus possess the disclosed utility. Where a claimed genus represents a diverse and relatively poorly understood group of microorganisms, the required level of disclosure will be greater than, for example, the disclosure of an invention involving a predictable factor such as a mechanical or electrical element.

COUNSEL:

Ian C. McLeod, Ian C. McLeod, P.C., of Okemos, Michigan, argued for Appellant.

Teddy S. Gron, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for Appellee. With him on the brief were Fred E. McKelvey, Solicitor and Richard E. Schafer, Associate Solicitor.

JUDGES:

Rich, Archer, and Mayer, Circuit Judges. Mayer, Circuit Judge, dissenting.

OPINIONBY:

RICH

OPINION:

[*489] RICH, Circuit Judge

This appeal is from the September 12, 1990 decision of the Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences (Board), affirming the examiner's rejection of claims 1-48 and 50-52 of application Serial No. 07/021,405, filed March 4, 1987, titled "Hybrid Genes Incorporating a DNA Fragment Containing a Gene Coding for an Insecticidal Protein, Plasmids, Transformed Cyanobacteria Expressing Such Protein and Method for Use as a Biocontrol Agent" as unpatentable under 35 U.S.C. § 103, as well as the rejection of claims 1-48 and 50-51 under 35 U.S.C. § 112, first paragraph, for lack of enablement. We reverse the § 103 rejection. The § 112 rejection is affirmed in part [**2] and reversed in part.

BACKGROUND

A. The Invention

The claimed invention is directed to the use of genetic engineering techniques n1 for production of proteins that are toxic to insects such as larvae of mosquitos and black flies. These swamp-dwelling pests are the source of numerous human health problems, including malaria. It is known that certain species of the naturally-occurring *Bacillus* genus of bacteria produce proteins ("endotoxins") that are toxic to these insects. Prior art methods of combatting the insects involved spreading or spraying crystalline spores of the insecticidal *Bacillus* proteins over swamps. The spores were environmentally unstable, however, and would often sink to the bottom of a swamp before being consumed, thus rendering this method prohibitively expensive. Hence the need for a lower-cost method of producing the insecticidal *Bacillus* proteins in high volume, with application in a more stable vehicle.

n1 Basic vocabulary and techniques for gene cloning and expression have been described in *In re O'Farrell*, 853 F.2d 894, 895-99, 7 U.S.P.Q.2D (BNA) 1673, 1674-77 (Fed. Cir. 1988), and are not repeated here.

[**3]

As described by appellants, the claimed subject matter meets this need by providing for the production of the insecticidal *Bacillus* proteins within host cyanobacteria. Although both cyanobacteria and bacteria are members of the procaryote n2 kingdom, the cyanobacteria (which in the past have been referred to as "blue-green algae") are unique among procaryotes in that the cyanobacteria are capable of oxygenic photosynthesis. The cyanobacteria grow on top of swamps where they are consumed by mosquitos and black flies. Thus, when *Bacillus* proteins are produced within [*490] transformed n3 cyanobacterial hosts according to the claimed invention, the presence of the insecticide in the food of the targeted insects advantageously guarantees direct uptake by the insects.

n2 All living cells can be classified into one of two broad groups, procaryotes and eucaryotes. The procaryotes comprise organisms formed of cells that do not have a distinct nucleus; their DNA floats throughout the cellular cytoplasm. In contrast, the cells of eucaryotic organisms such as man, other animals, plants, protozoa, algae and yeast have a distinct nucleus wherein their DNA resides. [**4]

n3 "Transformed" cyanobacteria are those that have successfully taken up the foreign *Bacillus* DNA such that the DNA information has become a permanent part of the host cyanobacteria, to be replicated as new cyanobacteria are generated.

More particularly, the subject matter of the application on appeal includes a chimeric (i.e., hybrid) gene comprising (1) a gene derived from a bacterium of the *Bacillus* genus whose product is an insecticidal protein, united with (2) a DNA promoter effective for expressing n4 the *Bacillus* gene in a host cyanobacterium, so as to produce the desired insecticidal protein.

N4 "Expression" of a gene refers to the production of the protein which the gene encodes; more specifically, it is the process of transferring information from a gene (which consists of DNA) via messenger RNA to ribosomes where a specific protein is made.

The claims on appeal are 1-48 and 50-52, all claims remaining in the [**5] application. Claim 1 reads:

> 1. A chimeric gene capable of being expressed in Cyanobacteria cells comprising:
> (a) a DNA fragment comprising a promoter region which is effective for expression of a DNA fragment in a Cyanobacterium; and
> (b) at least one DNA fragment coding for an insecticidally active protein produced by a Bacillus strain, or coding for an insecticidally active truncated form of the above protein or coding for a protein having substantial sequence homology to the active protein,

the DNA fragments being linked so that the gene is expressed.

Claims 2-15, which depend from claim 1, recite preferred *Bacillus* species, promoters, and selectable markers. n5 Independent claim 16 and claims 17-31 which depend therefrom are directed to a hybrid plasmid vector which includes the chimeric gene of claim 1. Claim 32 recites a bacterial strain. Independent claim 33 and claims 34-48 which depend therefrom recite a cyanobacterium which expresses the chimeric gene of claim 1. Claims 50-51 recite an insecticidal composition. Claim 52 recites a particular plasmid that appellants have deposited.

n5 In the context of the claimed invention, "selectable markers" or "marker genes" refer to antibiotic-resistance conferring DNA fragments, attached to the gene being expressed, which facilitate the selection of successfully transformed cyanobacteria.

[**6]

B. Appellants' Disclosure

In addition to describing the claimed invention in generic terms, appellants' specification discloses two particular species of *Bacillus (B. thuringiensis, B. sphaericus)* as sources of insecticidal protein; and nine

genera of cyanobacteria (*Synechocystis, Anacystis, Synechococcus, Agmenellum, Aphanocapsa, Gloecapsa, Nostoc, Anabaena* and *Ffremyllia*) as useful hosts.

The working examples relevant to the claims on appeal detail the transformation of a single strain of cyanobacteria, i.e., *Synechocystis* 6803. In one example, *Synechocystis* 6803 cells are transformed with a plasmid comprising (1) a gene encoding a particular insecticidal protein ("B.t. 8") from *Bacillus thuringiensis* var. *israelensis*, linked to (2) a particular promoter, the P[L] promoter from the bacteriophage Lambda (a virus of *E. coli*). In another example, a different promoter, i.e., the *Synechocystis* 6803 promoter for the rubisco operon, is utilized instead of the Lambda P[L] promoter.

C. The Prior Art

A total of eleven prior art references were cited and applied, in various combinations, against the claims on appeal.

The focus of Dzelzkalns, n6 [**7] the primary reference cited against all of the rejected claims, is to determine whether chloroplast promoter sequences can function in cyanobacteria. To that end Dzelzkalns discloses the expression in cyanobacteria of a chimeric gene comprising a chloroplast promoter [*491] sequence fused to a gene encoding the enzyme chloramphenicol acetyl transferase (CAT). n7 Importantly, Dzelzkalns teaches the use of the CAT gene as a "marker" gene; this use of antibiotic resistance-conferring genes for selection purposes is a common technique in genetic engineering.

n6 12 *Nucleic Acids Res.* 8917 (1984).

n7 Chloramphenicol is an antibiotic; CAT is an enzyme which destroys chloramphenicol and thus imparts resistance thereto.

Sekar I, n8 Sekar II, n9 and Ganesan n10 collectively disclose expression of genes encoding certain *Bacillus* insecticidal proteins in the bacterial hosts *B. megaterium, B. subtilis* and *E. coli*.

n8 137 *Biochem. and Biophys. Res. Comm.* 748 (1986). [**8]

n9 33 *Gene* 151 (1985).

n10 189 *Mol. Gen. Genet.* 181 (1983).

Friedberg n11 discloses the transformation of the cyanobacterium *Anacystis nidulans* R2 by a plasmid vector comprising the O[L]P[L] operator-promoter region and a temperature-sensitive repressor gene of the bacteriophage Lambda. While the cyanobacteria are attractive organisms for the cloning of genes involved in photosynthesis, Friedberg states, problems may still be encountered such as suboptimal expression of the cloned gene, detrimental effects on cell growth of over-expressed, highly hydrophobic proteins, and rapid turnover of some gene products. To address these problems, Friedberg teaches the use of the disclosed Lambda regulatory signals in plasmid vehicles which, it states, have "considerable potential for use as vectors the expression of which can be controlled in *Anacystis* . . . ."

n11 203 *Mol. Gen. Genet.* 505 (1986).

Miller n12 compares [**9] the initiation specificities *in vitro* of DNA-dependent RNA polymerases n13 purified from two different species of cyanobacteria (*Fremyella diplosiphon* and *Anacystis nidulans*), as well as from *E. coli.*

n12 140 *J. Bacteriology* 246 (1979).

n13 RNA polymerase, the enzyme responsible for making RNA from DNA, binds at specific nucleotide sequences (promoters) in front of genes in DNA, and then moves through the gene making an RNA molecule that includes the information contained in the gene. Initiation specificity is the ability of the RNA polymerase to initiate this process specifically at a site(s) on the DNA template.

Nierzwicki-Bauer n14 identifies in the cyanobacterium *Anabaena* 7120 the start site for transcription of the gene encoding *rbcL*, the large subunit of the enzyme ribulose-1,5-bisphosphate carboxylase. It reports that the nucleotide sequence 14-8 base pairs preceding the transcription start site "resembles a good *Escherichia coli* promoter," but that the sequence 35 base pairs before the [**10] start site does not.

n14 81 *Proc. Natl. Acad. Sci. USA* 5961 (1984).

Chauvat n15 discloses host-vector systems for gene cloning in the cyanobacterium *Synechocystis* 6803, in

which the antibiotic resistance-conferring *neo* gene is utilized as a selectable marker.

n15 204 *Mol. Gen. Genet.* 185 (1986).

Reiss n16 studies expression in *E. coli* of various proteins formed by fusion of certain foreign DNA sequences with the *neo* gene.

n16 30 *Gene* 211 (1984).

Kolowsky n17 discloses chimeric plasmids designed for transformation of the cyanobacterium *Synechococcus* R2, comprising an antibiotic-resistant gene linked to chromosomal DNA from the *Synechococcus* cyanobacterium.

n17 27 *Gene* 289 (1984).

[**11]

Barnes, United States Patent No. 4,695,455, is directed to the treatment with stabilizing chemical reagents of pesticides produced by expression of heterologous genes (such as those encoding *Bacillus* proteins) in host microbial cells such as *Pseudomonas* bacteria. The host cells are killed by this treatment, but the resulting pesticidal compositions exhibit prolonged toxic activity when exposed to the environment of target pests.

[*492] *D. The Grounds of Rejection*

1. The § 103 Rejections

Claims 1-6, 16-21, 33-38, 47-48 and 52 (which include all independent claims in the application) were rejected as unpatentable under 35 U.S.C. § 103 based upon Dzelzkalns in view of Sekar I or Sekar II and Ganesan. The examiner stated that Dzelzkalns discloses a chimeric gene capable of being highly expressed in a cyanobacterium, said gene comprising a promoter region effective for expression in a cyanobacterium operably linked to a structural gene encoding CAT. The examiner acknowledged that the chimeric gene and transformed host of Dzelzkalns differ from the claimed invention in that the former's structural gene encodes CAT rather than insecticidally active protein. However, the examiner pointed [**12] out, Sekar I, Sekar II, and Ganesan teach genes encoding insecticidally active proteins produced by *Bacillus*, and the advantages of expressing such genes in heterologous n18 hosts to obtain larger quantities of the protein. The examiner contended that it would have been obvious to one of ordinary skill in the art to substitute the *Bacillus* genes taught by Sekar I, Sekar II, and Ganesan for the CAT gene in the vectors of Dzelzkalns in order to obtain high level expression of the *Bacillus* genes in the transformed cyanobacteria. The examiner further contended that it would have been obvious to use cyanobacteria as heterologous hosts for expression of the claimed genes due to the ability of cyanobacteria to serve as transformed hosts for the expression of heterologous genes. In the absence of evidence to the contrary, the examiner contended, the invention as a whole was prima facie obvious.

n18 Denotes different species or organism.

Additional rejections were entered against various groups of dependent claims [**13] which we need not address here. All additional rejections were made in view of Dzelzkalns in combination with Sekar I, Sekar II, and Ganesan, and further in view of other references discussed in Part C above.

The Board affirmed the § 103 rejections, basically adopting the examiner's Answer as its opinion while adding a few comments. The legal conclusion of obviousness does not require absolute certainty, the Board added, but only a reasonable expectation of success, citing *In re O'Farrell*, 853 F.2d 894, 7 U.S.P.Q.2D (BNA) 1673 (Fed. Cir. 1988). In view of the disclosures of the prior art, the Board concluded, one of ordinary skill in the art would have been motivated by a reasonable expectation of success to make the substitution suggested by the examiner.

2. The § 112 Rejection

The examiner also rejected claims 1-48 and 50-51 under 35 U.S.C. § 112, first paragraph, on the ground that the disclosure was enabling only for claims limited in accordance with the specification as filed. Citing *Manual of Patent Examining Procedure* (MPEP) provisions 706.03(n) n19 and (z) n20 as support, the examiner took the position that undue experimentation would be required of [**14] the art worker to practice the claimed invention, in view of the unpredictability in the art, the breadth of the claims, the limited number of working examples and the limited guidance provided [*493] in the specification. With respect to unpredictability, the examiner stated that

> the cyanobacteria comprise a large and diverse group of photosynthetic bacteria including large numbers of species in some 150 different genera including *Synechocystis, Anacystis,*

Synechococcus, Agmenellum, Nostoc, Anabaena, etc. The molecular biology of these organisms has only recently become the subject of intensive investigation and this work is limited to a few genera. Therefore the level of unpredictability regarding heterologous gene expression in this large, diverse and relatively poorly studied group of procaryotes is high. . . .

n19 MPEP 706.03(n), "Correspondence of Claim and Disclosure," provides in part:

> In chemical cases, a claim may be so broad as to not be supported by [the] disclosure, in which case it is rejected as unwarranted by the disclosure. . . .

n20 MPEP 706.03(z), "Undue Breadth," provides in part:

> In applications directed to inventions in arts where the results are unpredictable, the disclosure of a single species usually does not provide an adequate basis to support generic claims. *In re Sol*, 1938 C.D. 723; 497 O.G. 546. This is because in arts such as chemistry it is not obvious from the disclosure of one species, what other species will work. *In re Dreshfield*, 1940 C.D. 351; 518 O.G. 255 gives this general rule: "It is well settled that in cases involving chemicals and chemical compounds, which differ radically in their properties it must appear in an applicant's specification either by the enumeration of a sufficient number of the members of a group or by other appropriate language, that the chemicals or chemical combinations included in the claims are capable of accomplishing the desired result.". . .

[**15]

The Board affirmed, noting that "the limited guidance in the specification, considered in light of the relatively high degree of unpredictability in this particular art, would not have enabled one having ordinary skill in the art to practice the broad scope of the claimed invention without undue experimentation. *In re Fisher*, 57 C.C.P.A. 1099, 427 F.2d 833, 166 U.S.P.Q. (BNA) 18 (CCPA 1970)."

OPINION

A. *Obviousness*

We first address whether the PTO erred in rejecting the claims on appeal as prima facie obvious within the meaning of 35 U.S.C. § 103. [HN1] Obviousness is a legal question which this court independently reviews, though based upon underlying factual findings which we review under the clearly erroneous standard. *In re Woodruff*, 919 F.2d 1575, 1577, 16 U.S.P.Q.2D (BNA) 1934, 1935 (Fed. Cir. 1990).

[HN2] Where claimed subject matter has been rejected as obvious in view of a combination of prior art references, a proper analysis under § 103 requires, *inter alia*, consideration of two factors: (1) whether the prior art would have suggested to those of ordinary skill in the art [**16] that they should make the claimed composition or device, or carry out the claimed process; and (2) whether the prior art would also have revealed that in so making or carrying out, those of ordinary skill would have a reasonable expectation of success. *See In re Dow Chemical Co.*, 837 F.2d 469, 473, 5 U.S.P.Q.2D (BNA) 1529, 1531 (Fed. Cir. 1988). Both the suggestion and the reasonable expectation of success must be founded in the prior art, not in the applicant's disclosure. *Id.*

We agree with appellants that the PTO has not established the prima facie obviousness of the claimed subject matter. The prior art simply does not disclose or suggest the expression in cyanobacteria of a chimeric gene encoding an insecticidally active protein, or convey to those of ordinary skill a reasonable expectation of success in doing so. More particularly, there is no suggestion in Dzelzkalns, the primary reference cited against all claims, of substituting in the disclosed plasmid a structural gene encoding *Bacillus* insecticidal proteins for the CAT gene utilized for selection purposes. The expression of antibiotic resistance-conferring genes in cyanobacteria, without more, [**17] does not render obvious the expression of unrelated genes in cyanobacteria for unrelated purposes.

The PTO argues that the substitution of insecticidal *Bacillus* genes for CAT marker genes in cyanobacteria is suggested by the secondary references Sekar I, Sekar II, and Ganesan, which collectively disclose expression of genes encoding *Bacillus* insecticidal proteins in two species of host *Bacillus* bacteria (B. *megaterium* and B. *subtilis*) as well as in the bacterium *E. coli*. While these references disclose expression of *Bacillus* genes encoding insecticidal proteins in certain transformed *bacterial* hosts, nowhere do these references disclose or suggest expression of such genes in transformed *cyanobacterial* hosts.

To remedy this deficiency, the PTO emphasizes similarity between bacteria and cyanobacteria, namely, that these are both procaryotic organisms, and argues that this fact would suggest to those of ordinary skill the use of cyanobacteria as hosts for expression of the claimed chimeric genes. While it is true that bacteria and cyanobacteria are now both classified as procaryotes, that fact alone is not sufficient to motivate the art worker as the [**18] PTO contends. [*494] As the PTO concedes, cyanobacteria and bacteria are not identical; they are classified as two separate divisions of the kingdom Procaryotae. n21 Moreover, it is only in recent years that the biology of cyanobacteria has been clarified, as evidenced by references in the prior art to "blue-green algae." Such evidence of recent uncertainty regarding the biology of cyanobacteria tends to rebut, rather than support, the PTO's position that one would consider the cyanobacteria effectively interchangeable with bacteria as hosts for expression of the claimed gene.

> n21 *Stedman's Medical Dictionary* 1139 (24th ed. 1982) (definition of "Procaryotae"). Procaryotic organisms are commonly classified according to the following taxonomic hierarchy: Kingdom; Division; Class; Order; Family; Genus; Species. 3 *Bergey's Manual of Systematic Bacteriology* 1601 (1989).

At oral argument the PTO referred to additional secondary references, not cited against any independent claim (i.e., Friedberg, Miller, and Nierzwicki-Bauer), [**19] which it contended disclose certain amino acid sequence homology between bacteria and cyanobacteria. The PTO argued that such homology is a further suggestion to one of ordinary skill to attempt the claimed invention. We disagree. As with the Dzelzkalns, Sekar I, Sekar II, and Ganesan references discussed above, none of these additional references disclose or suggest that cyanobacteria could serve as hosts for expression of genes encoding *Bacillus* insecticidal proteins. In fact, these additional references suggest as much about *differences* between cyanobacteria and bacteria as they do about similarities. For example, Nierzwicki-Bauer reports that a certain nucleotide sequence (i.e., the -10 consensus sequence) in a particular cyanobacterium resembles an *E. coli* promoter, but that another nearby nucleotide sequence (the -35 region) does not. While Miller speaks of certain promoters of the bacteriophage Lambda that are recognized by both cyanobacterial and *E. coli* RNA polymerases, it also discloses that these promoters exhibited differing strengths when exposed to the different polymerases. Differing sensitivities of the respective polymerases to an inhibitor are also [**20] disclosed, suggesting differences in the structures of the initiation complexes.

The PTO asks us to agree that the prior art would lead those of ordinary skill to conclude that cyanobacteria are attractive hosts for expression of any and all heterologous genes. Again, we can not. The relevant prior art does indicate that cyanobacteria are attractive hosts for expression of both native and heterologous *genes involved in photosynthesis* (not surprisingly, for the capability of undergoing oxygenic photosynthesis is what makes the cyanobacteria unique among procaryotes). However, these references do not suggest that cyanobacteria would be equally attractive hosts for expression of *unrelated* heterologous genes, such as the claimed genes encoding *Bacillus* insecticidal proteins.

In *O'Farrell*, this court affirmed an obviousness rejection of a claim to a method for producing a "predetermined protein in a stable form" in a transformed bacterial host. 853 F.2d at 895, 7 U.S.P.Q.2d at 1674. The cited references included a prior art publication (the Polisky reference) whose three authors included two of the three co-inventor-appellants. The main difference [**21] between the prior art and the claim at issue was that in Polisky, the heterologous gene was a gene for ribosomal RNA, while the claimed invention substituted a gene coding for a predetermined protein. *Id.* at 901, 7 U.S.P.Q.2d at 1679. Although, as the appellants therein pointed out, the ribosomal RNA gene is not normally translated into protein, Polisky mentioned preliminary evidence that the transcript of the ribosomal RNA gene was translated into protein, and further predicted that if a gene coding for a protein were to be substituted, extensive translation might result. *Id.* We thus affirmed, explaining that

> the prior art explicitly suggested the substitution that is the difference between the claimed invention and the prior art, and presented preliminary evidence

> suggesting that the [claimed] method could be used to make proteins.
> . . . . [*495] . . . Polisky contained detailed enabling methodology for practicing the claimed invention, a suggestion to modify the prior art to practice the claimed invention, and evidence suggesting that it would be successful.

Id. at 901-02, 7 U.S.P.Q.2d at 1679-80.

In contrast with the situation [**22] in *O'Farrell*, the prior art in this case offers no suggestion, explicit or implicit, of the substitution that is the difference between the claimed invention and the prior art. Moreover, the "reasonable expectation of success" that was present in *O'Farrell* is not present here. Accordingly, we reverse the § 103 rejections.

B. Enablement

[HN3] The first paragraph of 35 U.S.C. § 112 requires, *inter alia*, that the specification of a patent enable any person skilled in the art to which it pertains to make and use the claimed invention. Although the statute does not say so, enablement requires that the specification teach those in the art to make and use the invention without "undue experimentation." *In re Wands*, 858 F.2d 731, 737, 8 U.S.P.Q.2D (BNA) 1400, 1404 (Fed. Cir. 1988). That *some* experimentation may be required is not fatal; the issue is whether the amount of experimentation required is "undue." *Id.* at 736-37, 8 U.S.P.Q.2d at 1404. [HN4] Enablement, like obviousness, is a question of law which we independently review, although based upon underlying factual findings which we review for clear error. *See id.* at 735, 8 U.S.P.Q.2d at 1402. [**23]

In response to the § 112 rejection, appellants assert that their invention is "pioneering," and that this should entitle them to claims of broad scope. Narrower claims would provide no real protection, appellants argue, because the level of skill in this art is so high, art workers could easily avoid the claims. Given the disclosure in their specification, appellants contend that any skilled microbiologist could construct vectors and transform many different cyanobacteria, using a variety of promoters and *Bacillus* DNA, and could easily determine whether or not the active *Bacillus* protein was successfully expressed by the cyanobacteria.

The PTO made no finding on whether the claimed invention is indeed "pioneering," and we need not address the issue here. With the exception of claims 47 and 48, the claims rejected under § 112 are not limited to any particular genus or species of cyanobacteria. The PTO's position is that the cyanobacteria are a diverse and relatively poorly studied group of organisms, comprising some 150 different genera, and that heterologous gene expression in cyanobacteria is "unpredictable." Appellants have not effectively disputed these assertions. Moreover, [**24] we note that only one particular species of cyanobacteria is employed in the working examples of appellants' specification, and only nine genera of cyanobacteria are mentioned in the entire document.

Taking into account the relatively incomplete understanding of the biology of cyanobacteria as of appellants' filing date, as well as the limited disclosure by appellants of particular cyanobacterial genera operative in the claimed invention, we are not persuaded that the PTO erred in rejecting claims 1-46 and 50-51 under § 112, first paragraph. There is no reasonable correlation between the narrow disclosure in appellants' specification and the broad scope of protection sought in the claims encompassing gene expression in any and all cyanobacteria. *See In re Fisher*, 57 C.C.P.A. 1099, 427 F.2d 833, 839, 166 U.S.P.Q. (BNA) 18, 24 (CCPA 1970) (the first paragraph of § 112 requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification). n22 Accordingly, [*496] we affirm the § 112 rejection as to those claims.

> n22 The enablement rejection in this case was not based upon a post-filing date state of the art, as in *In re Hogan*, 559 F.2d 595, 605-07, 194 U.S.P.Q. (BNA) 527, 536-38 (CCPA 1977). *See also United States Steel Corp. v. Phillips Petroleum Co.*, 865 F.2d 1247, 1251, 9 U.S.P.Q.2D (BNA) 1461, 1464 (Fed. Cir. 1989) (citing *Hogan*); *Hormone Research Found., Inc. v. Genentech, Inc.*, 904 F.2d 1558, 1568-69, 15 U.S.P.Q.2D (BNA) 1039, 1047-48 (Fed. Cir. 1990) (directing district court, on remand, to consider effect of *Hogan* and *United States Steel* on the enablement analysis of *Fisher*), *cert. dismissed*, U.S. , 111 S. Ct. 1434, 113 L. Ed. 2d 485, 59 U.S.L.W. 3687 (1991). We therefore do not consider the effect of *Hogan* and its progeny on *Fisher's* analysis of when an inventor should be allowed to "dominate the future patentable inventions of others." *Fisher*, 427 F.2d at 839, 166 U.S.P.Q. at 24.

[**25]

In so doing we do *not* imply that patent applicants in art areas currently denominated as "unpredictable" must never be allowed generic claims encompassing more than the particular species disclosed in their specification. It is well settled that [HN5] patent applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. *In re Angstadt*, 537 F.2d 498, 502-03, 190 U.S.P.Q. (BNA) 214, 218 (CCPA 1976). However, there must be sufficient disclosure, either through illustrative examples or terminology, n23 to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed. This means that the disclosure must adequately guide the art worker to determine, without undue experimentation, which species among all those encompassed by the claimed genus possess the disclosed utility. Where, as here, a claimed genus represents a diverse and relatively poorly understood group of microorganisms, the required level of disclosure will be greater than, for example, the disclosure of an invention involving a "predictable" factor such as a mechanical or electrical element. *See Fisher*, 427 F.2d at 839, 166 U.S.P.Q. at 24. [**26] In this case, we agree with the PTO that appellants' limited disclosure does not enable one of ordinary skill to make and use the invention as now recited in claims 1-46 and 50-51 without undue experimentation.

n23 The first paragraph of § 112 requires nothing more than *objective* enablement. *In re Marzocchi*, 58 C.C.P.A. 1069, 439 F.2d 220, 223, 169 U.S.P.Q. (BNA) 367, 369 (CCPA 1971). How such a teaching is set forth, either by the use of illustrative examples or by broad terminology, is irrelevant. *Id.*

Remaining dependent claim 47 recites a cyanobacterium which expresses the chimeric gene of claim 1, wherein the cyanobacterium is selected from among the genera *Anacystis* and *Synechocystis*. Claim 48, which depends from claim 47, is limited to the cyanobacterium *Synechocystis* 6803. The PTO did not separately address these claims, nor indicate why they should be treated in the same manner as the claims encompassing all types of cyanobacteria. Although these claims are not limited to expression of [**27] genes encoding particular *Bacillus* proteins, we note what appears to be an extensive understanding in the prior art of the numerous *Bacillus* proteins having toxicity to various insects. The rejection of claims 47-48 under § 112 will not be sustained.

CONCLUSION

The rejection of claims 1-48 and 50-52 under 35 U.S.C. § 103 is *reversed*. The rejection of claims 1-46 and 50-51 under 35 U.S.C. § 112, first paragraph, is *affirmed* and the rejection of claims 47 and 48 thereunder is *reversed*.

AFFIRMED-IN-PART, REVERSED-IN-PART.

DISSENTBY:

MAYER

DISSENT:

MAYER, Circuit Judge, dissenting.

An appeal is not a second opportunity to try a case or prosecute a patent application, and we should not allow parties to "undertake to retry the entire case on appeal." *Perini America, Inc. v. Paper Converting Machine Co.*, 832 F.2d 581, 584, 4 U.S.P.Q.2D (BNA) 1621, 1624 (Fed. Cir. 1987); *Eaton Corp. v. Appliance Valves Corp.*, 790 F.2d 874, 877, 229 U.S.P.Q. (BNA) 668, 671 (Fed. Cir. 1986). But that is precisely what the court has permitted here. The PTO conducted a thorough examination of the prior art surrounding this patent application and concluded the claims would [**28] have been obvious. The board's decision based on the examiner's answer which comprehensively explains the rejection is persuasive and shows how the evidence supports the legal conclusion that the claims would have been obvious. Yet, the court ignores all this and conducts its own examination, if you will, as though the examiner and board did not exist. Even if I thought this opinion were more persuasive than the board's, I could [*497] not join it because it misperceives the role of the court.

The scope and content of the prior art, the similarity between the prior art and the claims, the level of ordinary skill in the art, and what the prior art teaches are all questions of fact. *Graham v. John Deere Co.*, 383 U.S. 1, 17, 148 U.S.P.Q. (BNA) 459, 467, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966); *Jurgens v. McKasy*, 927 F.2d 1552, 1560, 18 U.S.P.Q.2D (BNA) 1031, 1037 (Fed. Cir. 1991). And "where there are two permissible views of the evidence, the factfinder's choice between them cannot be clearly erroneous." *Anderson v. City of Bessemer City*, 470 U.S. 564, 574, 84 L. Ed. 2d 518, 105 S. Ct. 1504 (1985). The mere denomination of obviousness as a question of law does not give the court license to decide [**29] the factual matters afresh and ignore the requirement that they be respected unless clearly erroneous. *In re Woodruff*, 919 F.2d 1575, 1577, 16 U.S.P.Q.2D (BNA) 1934, 1935 (Fed. Cir. 1990); *In re Kulling*, 897 F.2d 1147, 1149, 14 U.S.P.Q.2D (BNA) 1056, 1057 (Fed. Cir. 1990). There may be more than one way to look at the prior art, but on this record we are

bound by the PTO's interpretation of the evidence because it is not clearly erroneous and its conclusion is unassailable. I would affirm on that basis.

LEXSEE 916 F.2D 680

IN RE PETER S. MILLS

No. 90-1184

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

916 F.2d 680; 1990 U.S. App. LEXIS 17697; 16 U.S.P.Q.2D (BNA) 1430

October 9, 1990, Decided

SUBSEQUENT HISTORY: [**1]

As Amended October 9, 1990.

PRIOR HISTORY: Appealed from: United States Patent and Trademark Office Board of Patent Appeals and Interferences.

DISPOSITION:

Reversed.

CASE SUMMARY:

PROCEDURAL POSTURE: Petitioner appealed an order of the United States Patent and Trademark Office Board of Patent Appeals and Interferences affirming the examiner's rejection of certain apparatus claims in petitioner's patent application under 35 U.S.C.S. § 103.

OVERVIEW: The Patent and Trademark Office (PTO) Board of Patent Appeals and Interferences affirmed the PTO examiner's rejection of certain apparatus claims in petitioner's patent application under 35 U.S.C.S. § 103. The examiner found that the claims were not patentable because they were obvious in view of the prior art. The court reversed. The court found that the language of the rejection suggested a lack of novelty under 35 U.S.C.S. § 102, rather than an obviousness rejection, but that no lack of novelty rejection had been made. The court then reviewed the PTO's determination of obviousness, based on the scope and content of the earlier reference and the differences between the earlier reference and petitioner's claims, for correctness or error. The court concluded that the PTO was in error in rejecting the claims as obvious where there was no suggestion in the earlier reference that came close to petitioner's claimed apparatus.

OUTCOME: The court reversed the rejection of certain apparatus claims in petitioner's patent application where the Patent and Trademark Office erred in rejecting the claims as obvious where there was no suggestion in the earlier reference that came close to petitioner's claimed apparatus.

LexisNexis(R) Headnotes

Patent Law > Jurisdiction & Review > Standards of Review > General Overview
Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN1] Non-obviousness is a question of law to be determined from the facts. The appellate court reviews the Patent and Trademark Office Board of Patent Appeals and Interferences' determination of obviousness, based on the scope and content of the earlier reference and the differences between the earlier reference and the application claims, for correctness or error.

Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN2] The mere fact that prior art can be modified does not make the modification obvious unless the prior art suggest the desirability of the modification.

COUNSEL:

James C. Wray, of McLean, Virginia, argued for Appellant.

Muriel E. Crawford, Assistant Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for Appellee. With her on the brief was Fred E. McKelvey, Solicitor.

JUDGES:

Mayer, Circuit Judge, Miller, Senior Circuit Judges, and Lourie, Circuit Judge.

OPINIONBY:

LOURIE

OPINION:

[*681] LOURIE, Circuit Judge

This appeal is from the November 2, 1989, decision of the United States Patent and Trademark Office Board of Patent Appeals and Interferences (Board), Appeal No. 88-0141, affirming the examiner's rejection, under 35 U.S.C. § 103, of claims 6-9 and 11-14 in Mills' application Serial No. 891,374, a continuation of Serial No. 607-805, filed May 4, 1984, entitled "Methods of and Apparatus for Producing Aerated Cementitious Compounds." The remainder of the claims (1-5, 10, and 15) have all been cancelled. We reverse.

I

BACKGROUND

A. *The Invention*

Mills' claimed invention is an apparatus for producing aerated cemetitious [**2] compositions. Claim 6 is the broadest claim:

> 6. Apparatus for producing an aerated cementitious composition, comprising
>
> a mixing chamber being open to atmosphere and containing mixing means,
>
> feed means for feeding ingredients comprising cement, foaming agent and liquid to the mixing chamber,
>
> mixing means for mixing ingredients fed to the mixing chamber, pump means for pumping the mixed ingredients to a desired site and having a pump inlet connected to an outlet of the mixing chamber,
>
> drive motor means connected through gearbox means providing a pumping capacity of the pump means greater than the feed rate of the ingredients to the mixing chamber provided by the feed means, such that in operation air is drawn into the mixing chamber, and entrained in the mixed ingredients.

The essence of Mills' invention is the machine's ability to aerate a cementitious composition by driving the output pump at a capacity greater than the feed rate, thereby drawing air into the composition. This aeration produces a composition with substantially lower density than standard cementitious composition mixing ingredients.

B. *The Reference*

The sole reference upon [**3] which the Board relied in affirming the examiner's rejection was Mathis et al. U.S. Patent 4,117,547 (Mathis). n1 Mathis discloses a mixing chamber which is open to the atmosphere and which contains a mixing means. Two feed means for feeding ingredients in the mixing chamber are provided. The first feed means may consist of a screw conveyer and the second, a flow metering device such as an adjustable valve. A pump means pumps the mixture from the mixing chamber to a desired site and a drive motor means is connected to mixing means and pump means. A separate motor drives the feed means.

> n1 The examiner rejected the claims at issue under 35 U.S.C. § 103 as being unpatentable not only over Mathis but also in view of Gibson et al. U.S. Patent 2,717,770. However, the Board affirmed the examiner's rejection of claims 6-9 and 11-14 based solely on the Mathis reference. With regard to Gibson the Board stated:
>
> > We view the teachings of Gibson at best as being merely confirmatory of the fact that aerated mixtures can be produced by machines in which a pump means operates upon a mixing chamber at a greater rate than the ingredients are fed thereunto so that air is drawn into the mixing chamber and entrained in the mixed ingredients.

[**4]

A control system exists to arrest the feed means so as not to overfill the mixing chamber. This system comprises a level detector in the mixing chamber, which signals the feed means to close when the mixing chamber stores the predetermined maximum permissible quantity of material.

C. *The Rejection*

The Board affirmed the examiner's Section 103 rejection of claims 6-9 and 11-14, "finding correspondence in the Mathis reference for all of the subject matter recited in the appellants' claims. . . ." With regard to Mills' claim language relating to aerating the mixture, the Board stated: "in our opinion, the differences between claim 6 and the Mathis machine . . . lie solely in [*682] the functional language of the claim." The Board further found that Mathis teaches the use of separate input and output motors in order to permit the various mixing means and pumps to operate at different rates, and that Mathis "contemplates a situation wherein the rate of the outlet pump would be greater than the inlet pumps. . . ." The Board concluded on this point: "we are of the opinion that the Mathis machine is capable of being operated in such a fashion as to cause [the output] [**5] pump 18 to draw air into the mixing chamber 17 so that it is entrained in the mixture."

The Board also agreed with Mills' contention that Mathis is not directed to the problem of producing aerated cementitious material, but noted that Mills is not claiming a method, but an apparatus, and all of Mills' apparatus structure is present in the Mathis machine.

II

DISCUSSION

All of the rejected claims are apparatus claims. The Board found "correspondence in the Mathis reference for all of the subject matter recited in appellants' claims" and that "the Mathis machine discloses all of the structure set forth in claim 1" (a method claim not before us). It asserts that the use of such a mechanism would have been obvious and that the differences between claim 6 and the Mathis machine lie solely in the functional language of the claim, the preamble merely stating an intended use for the machine. This language suggests a lack of novelty rejection under 35 U.S.C. § 102, rather than an obviousness rejection. However, no Section 102 rejection has been made or is before us. What is before us is a rejection for obviousness, and we must decide whether the Board erred in [**6] that rejection.

We note first that [HN1] nonobviousness is a question of law to be determined from the facts. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1535, 218 U.S.P.Q. (BNA) 871, 876 (Fed. Cir. 1983). We review the Board's determination of obviousness, based on the scope and content of the Mathis reference and the differences between the Mathis reference and the Mills claims, for correctness or error. *In re Carleton*, 599 F.2d 1021, 1024 n.14, 202 USPQ (BNA) 165, 169 n.14 (CCPA 1979).

After reviewing the record, the arguments in the briefs, and the Mathis reference, we conclude that Mathis would not have rendered the claimed invention obvious. The closest Mathis comes to suggesting Mills' claimed apparatus is at column 3, lines 42-47, which states

> The rate at which the inlet 2b receives a solid constituent depends on the speed of the feed screw 4. Such speed can be regulated by a prime mover 6 which includes a variable-speed transmission.

This brief reference contains no suggestion of "pump means and the feed means providing [**7] a pumping capacity of the pump means greater than the feed rate of ingredients to the mixing chamber provided by the feed means, such that in operation air is drawn into the mixing chamber, and air entrained in the mixed ingredients," as provided for in Mills' claim 6. While Mathis' apparatus may be capable of being modified to run the way Mills' apparatus is claimed, there must be a suggestion or motivation in the reference to do so. *See In re Gordon*, 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984) ("The [HN2] mere fact that the prior art could be so modified would not have made the modification obvious unless the prior art suggested the desirability of the modification."). We see no such suggestion. The apparatus claimed by Mills is different from that of Mathis, since the fact that motor 6 of Mathis (the feed means) can be run at a variable speed does not require that motor 20 (connected to the pump) be run at a lesser speed "such that in operation air is drawn into the mixing chamber and air entrained in the mixed ingredients."

The Board found that the difference between [**8] the claimed subject matter and the prior art resided solely in functional language and that appellant had to show that the prior art device lacked the functional characteristics of the claimed device, citing [*683] *In re Ludtke*, 441 F.2d 660, 58 C.C.P.A. 1159, 169 U.S.P.Q. (BNA) 563 (1971). *Ludtke*, however, dealt with a rejection for lack of novelty, in which case it was proper to require that a prior art reference cited as anticipating a claimed invention be shown to lack the characteristics of the claimed invention. That proof would in fact negate the assertion that the claimed invention was described in the prior art. We are here, however, facing an

obviousness issue. It is not pertinent whether the prior art device possesses the functional characteristics of the claimed invention if the reference does not describe or suggest its structure. That is the case here. Given the facts before us, we hold that the Board was in error in affirming the examiner's rejection of claims 6-9 and 11-13 as obvious in view of Mathis, and we therefore *reverse* the Board.

REVERSED.

LEXSEE 972 F.2D 1260

IN RE JOHN R. FRITCH

91-1318

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

972 F.2d 1260; 1992 U.S. App. LEXIS 18470; 23 U.S.P.Q.2D (BNA) 1780; 92 Daily Journal DAR 11427

August 11, 1992, Decided

PRIOR HISTORY: [**1] Appealed from: U.S. Patent and Trademark Office Board of Patent Appeals and Interferences

DISPOSITION: REVERSED

CASE SUMMARY:

PROCEDURAL POSTURE: Appellant sought review of the decision of the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences affirming the decision that appellant's invention would have been obvious to one of ordinary skill in the art and was therefore unpatentable under 35 U.S.C.S. § 103.

OVERVIEW: Appellant sought a patent for an invention intended to be used as a landscape fill retainer. The examiner rejected appellant's application, concluding that the invention would have been obvious to one of ordinary skill in the art and was unpatentable under 35 U.S.C.S. § 103. Prior art included the Wilson Patent, intended to be used adjacent to sidewalk borders and flower beds, and the Hendrix Patent, intended to be used to retain gravel in driveways. The board affirmed. The court reversed, holding that there was no teaching, suggestion, or incentive in the prior art to modify or to combine the teachings of the prior art in the manner suggested by the examiner; obviousness could not be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination; and the examiner relied on hindsight in determination of obviousness.

OUTCOME: The court reversed, holding that it was impermissible to use appellant's claimed invention as an instruction manual to piece together the teachings of the prior art, thus rendering a determination that the claimed invention was obvious.

LexisNexis(R) Headnotes

Patent Law > Nonobviousness > Evidence & Procedure > Fact & Law Issues
Patent Law > Inequitable Conduct > Effect, Materiality & Scienter > General Overview
Patent Law > Jurisdiction & Review > Standards of Review > General Overview
[HN1] Obviousness is a question of law to be determined from the facts. The obviousness determination is based upon underlying factual inquiries concerning the claimed invention and the prior art, which are reviewed for clear error. However, it is the ultimate conclusion of obviousness that the Federal Circuit reviews as a matter of law.

Patent Law > Anticipation & Novelty > General Overview
[HN2] It is well settled that a prior art reference is relevant for all that it teaches to those of ordinary skill in the art.

Patent Law > Nonobviousness > Elements & Tests > Ordinary Skill Standard
Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > Nonobviousness > Evidence & Procedure > General Overview
[HN3] In proceedings before the United States Patent and Trademark Office, the examiner bears the burden of establishing a prima facie case of obviousness based

upon the prior art. The examiner can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art would lead that individual to combine the relevant teachings of the references. The patent applicant may then attack the examiner's prima facie determination as improperly made out, or the applicant may present objective evidence tending to support a conclusion of nonobviousness.

Patent Law > Nonobviousness > Evidence & Procedure > General Overview
Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN4] Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. Under 35 U.S.C.S. § 103, teachings of references can be combined only if there is some suggestion or incentive to do so. Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the examiner does not make the modification obvious unless the prior art suggested the desirability of the modification.

Patent Law > Nonobviousness > Elements & Tests > Hindsight
[HN5] It is impermissible to use the claimed invention as an instruction manual or "template" to piece together the teachings of the prior art so that the claimed invention is rendered obvious. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > U.S. Patent & Trademark Office Proceedings > General Overview
Patent Law > Claims & Specifications > Claim Language > Dependent Claims
[HN6] Dependent claims are nonobvious if the independent claims from which they depend are nonobvious.

COUNSEL: Charles L. Gholz, Oblon, Spivak, McClelland, Maier, et al, of Arlington, Virginia, argued for appellant. John R. Fritch, of Corpus Christi, Texas, was on the brief.

Jameson Lee, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for appellee. With him on the brief was Fred E. McKelvey, Solicitor. Of counsel was Richard E. Schafer.

JUDGES: Before PLAGER, Circuit Judge, SMITH, Senior Circuit Judge, and RADER, Circuit Judge.

OPINIONBY: SMITH

OPINION:

[*1261] SMITH, Senior Circuit Judge.

John R. Fritch (Fritch) appeals the 27 February 1991 decision of the Patent and Trademark Office Board of Patent Appeals and Interferences (Board) affirming-in-part the Examiner's final rejection of the remaining claims in Fritch's application entitled Landscape Edging Apparatus and Method. n1 The Examiner concluded that Fritch's invention would have been obvious to one of ordinary skill in the art and was therefore unpatentable under 35 U.S.C. § 103. The Board, except for allowing claim 28, agreed. The Board's decision is reversed.

n1 Serial No. 06/838,721.

[**2]

Issue

The issue is whether the Board erred in affirming the Examiner's determination that the prior art references of Wilson and Hendrix rendered the subject matter of Fritch's independent claims 1, 13, 24, and 29 obvious to one of ordinary skill in the art.

Background

In his final rejection, the Examiner rejected claims 1-24 and 27-30 of Fritch's application as unpatentable for obviousness under 35 U.S.C. § 103. Fritch appealed the final rejection to the Board. The Board affirmed the rejection as to claims 1-24, 29 and 30, entered a new ground of rejection for claim 27, and reversed as to claim 28. The Board agreed with the Examiner that the teachings of the Wilson and Hendrix patents rendered the subject matter of independent claims 1, 13, 24, and 29 obvious to one of ordinary skill in the art. Fritch does not appeal the Board's disposition as to claims 27 and 28, and at oral argument withdrew the appeal as to claim 8. The claims remaining in this appeal are 1-7, 9-24, 29 and 30.

The Fritch Invention

The invention claimed by Fritch involves a landscape edging device which includes a planar base portion and an upwardly extending retainer portion. The base portion [**3] is elongate, thin, flexible and has a

planar bottom surface conformable to a varying slope ground surface. One longitudinal [*1262] edge of the base portion serves as a mowing strip and the other serves as a retaining flange for landscape fill. The upwardly extending retainer portion is integrally connected (e.g., fused) to the base portion and defines a longitudinally extending enclosed space. The Fritch invention is intended to be used as a retainer for landscape fill in order to separate unmowable landscape fill from the mowable lawn. It may also be used to secure a landscaping sheet to the ground, or to function as guards at the base of a fence. Independent claims 1 and 13 on appeal are representative of the subject matter claimed:

1. A landscape edging strip formed in its entirety of a thin gauge, flexible material and conformable to a ground surface of varying slope, comprising a continuous elongate, thin gauge, flexible base portion having a planar bottom surface conformable to said varying slope ground surface; a thin gauge, elongate retainer portion integral with said base portion and extending upwardly therefrom and transversely thereover to overlie a portion of said base portion; [**4] all of said retainer portion defining a longitudinally extending enclosed space; said retainer portion being integrally connected to said base portion adjacent one longitudinal edge of said base portion to define a mowing strip adjacent the other longitudinal edge of said base portion.

* * * *

13. A landscape edging strip formed in its entirety from thin gauge, flexible material and conformable to a ground surface of varying slope, comprising a continuous elongate, thin gauge, flexible base portion having a planar bottom surface conformable to said varying slope ground surface; a thin gauge, elongate retainer portion integral with said base portion and extending upwardly therefrom and transversely thereover to overlie a portion of said base portion; all of said retainer portion defining a longitudinally extending enclosed space; said retainer portion being integrally connected to said base portion at a transverse location between the longitudinal edges of said base portion, thereby defining a longitudinally extending retaining flange on one side of said retainer portion and a mowing strip on the other side of said retainer portion.

* * * *

The critical language in Fritch's independent [**5] claims is that the device is to be, in its entirety, both flexible and "conformable to a ground surface of varying slope". These limitations, although located in the claims' preambles, "are necessary to give meaning to the claim[s] and properly define the invention". n2 Figure 1 from Fritch's drawings is reproduced below:

[SEE FIG. 1 IN ORIGINAL]

n2 *Perkin Elmer Corp. v. Computervision Corp.*, 732 F.2d 888, 896, 221 USPQ 669, 675 (Fed. Cir. 1984).

[*1263] *The Prior Art*

a. The Wilson Patent

The Wilson patent relied upon by the Examiner and the Board is entitled "Grass Edging and Watering Device". n3 The embodiment of the Wilson device includes a substantially flat mowing strip extending horizontally from a longitudinally extending body portion. Opposite the mowing strip is a scored flange which may be broken off when not needed or wanted. Between the mowing strip and the flange, and extending vertically from the body portion is an anchoring leg. Located above the anchoring leg is the [**6] body portion which contains a water conduit and sprinkler head assembly. The device is intended to be used adjacent to the borders of walks and plant beds. Figures 1 and 4 from Wilson's drawings are reproduced below:

[SEE FIG. 1 IN ORIGINAL]

[SEE FIG. 4 IN ORIGINAL]

n3 U.S. Patent No. 3,485,449.

b. The Hendrix Patent

The Hendrix patent is entitled "Loose Material Retainer Strip". n4 The Solicitor chose not to discuss the Hendrix reference in his brief, stating that the Board had deemed Hendrix unnecessary to its decision. The Solicitor overstates the Board's position. The Board based its decision upon "a collective evaluation of the Wilson and Hendrix patents". We include Hendrix in our discussion because it did play a role in the rejection of Fritch's independent claims.

N4 U.S. Patent No. 4,349,596.

The Hendrix device is composed of elongated, [**7] flexible strips having substantially C-shaped cross-section. The bottom lip of the device is to be wider than the top lip in order to facilitate fastening the device to the ground. The device will fit most gentle contours,

and the top lip will yield laterally to build-up of gravel until the gravel can be redistributed. The concave portion of the strip is installed such that it faces the material to be retained in place. Hendrix contemplates that the retainer will be used in retaining gravel in driveways, lining flower beds, or on the shoulders of asphalt or concrete highways. Figure 1 of Hendrix's drawings is reproduced below:

[*1264] [SEE FIG. 1 IN ORIGINAL]

Standard of Review

[HN1] "Obviousness is a question of law to be determined from the facts." n5 The obviousness determination "is based upon underlying factual inquiries concerning the claimed invention and the prior art" which are reviewed for clear error. n6 However, it is the ultimate conclusion of obviousness which the Federal Circuit reviews as a matter of law. n7

n5 *In re De Blauwe,* 736 F.2d 699, 703, 222 USPQ 191, 195 (Fed. Cir. 1984). [**8]

n6 *In re Kulling,* 897 F.2d 1147, 1149, 14 USPQ2d 1056, 1057 (Fed. Cir. 1990).

n7 *In re De Blauwe,* 736 F.2d at 703, 222 USPQ at 195.

Teachings of Wilson

Fritch takes exception to the Examiner's findings of fact related to the teachings of the Wilson patent. The Examiner's rejection and the Board's opinion rely heavily on the use of Wilson in view of other references to declare the Fritch invention obvious. The Board states that it agrees with the Examiner's finding of fact regarding the teachings of Wilson. In the Examiner's answer, which the Board quotes, the Wilson device is described as follows:

Wilson discloses a landscaping edging strip comprising a relatively thin gauge, elongated flexible base portion including a mower strip B having a planar bottom surface conformable to a varying slope surface.

The Board states that the Wilson reference presents "substantial evidence that Wilson is both thin and flexible." The Board regards the Wilson device as teaching that it is flexible and conformable in its entirety. This [**9] finding demonstrates clear error.

[HN2] It is well settled that a prior art reference is relevant for all that it teaches to those of ordinary skill in the art. n8 The base portion of Wilson is not planar in its [*1265] entirety, as the Board's opinion suggests, but also includes a prominent anchoring leg to secure the device to the ground. The anchoring leg, which runs the length of the Wilson device, would inhibit longitudinal flexibility of the Wilson device. Indeed, Wilson expressly contemplates flexibility and conformability only in the mower strip. Wilson states that its mower strip may be lifted in order to pack dirt thereunder for the purpose of securing the device to the ground. Fritch, on the other hand, is claimed to be flexible in its entirety. The Board's holding that Wilson is flexible in its entirety is based upon a misapprehension of the scope of Wilson's teachings.

n8 *Beckman Instruments Inc. v. LKB Produkter AB,* 892 F.2d 1547, 1551, 13 USPQ2d 1301, 1304 (Fed. Cir. 1989).

Second, [**10] Wilson's anchoring leg prohibits conformability to the ground surface in the manner claimed by Fritch. The Examiner's description of Wilson as having a "planar bottom surface conformable to a varying slope surface" is applicable only in reference to the mower strip. This description, however, ignores the anchor leg and the fact that it must be placed into the ground. Wilson expressly teaches that the anchoring leg may be pushed into soft soils, but in harder terrain a trench is needed in order to place the Wilson sprinkler system. In order to install the Wilson apparatus, the ground surface must be altered to conform to the device rather than, as the Solicitor contends, that Wilson is freely conformable to the ground. Fritch, on the other hand, does not require such extensive alteration of the ground surface in order to install the device.

Prima Facie Obviousness

[HN3] In proceedings before the Patent and Trademark Office, the Examiner bears the burden of establishing a prima facie case of obviousness based upon the prior art. n9 "[The Examiner] can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary [**11] skill in the art would lead that individual to combine the relevant teachings of the references." n10 The patent applicant may then attack the Examiner's prima facie determination as improperly made out, or the applicant may present objective evidence tending to support a conclusion of nonobviousness. n11

n9 *In re Piasecki,* 745 F.2d 1468, 1471-72, 223 USPQ 785, 787-88 (Fed. Cir. 1984).

n10 *In re Fine,* 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988) (citing *In re Lalu,* 747 F.2d 703, 705, 223 USPQ 1257, 1258 (Fed. Cir. 1988)).

n11 *In re Heldt,* 58 C.C.P.A. 701, 433 F.2d 808, 811, 167 USPQ 676, 678 (CCPA 1970).

Fritch has attacked the Board's finding that the Examiner established that Fritch's claimed invention was prima facie obvious in view of the teachings of the prior art. The Board states that "a collective evaluation of the Wilson and the Hendrix patents would have rendered the subject [**12] matter of independent claims 1, 13, 24, and 29 obvious to one of ordinary skill." Fritch maintains that there is no teaching, suggestion, or incentive in the prior art to modify or to combine the teachings of the prior art in the manner suggested by the Examiner. We agree.

Wilson teaches a grass edging and watering device which includes an anchoring leg for securing the device to the ground. Wilson contemplates that a trench will need to be dug in order to allow the anchoring leg to be placed into the ground if the condition of the soil requires it. This anchoring leg prohibits flexibility and conformability over the length of Wilson. Any flexibility or conformability in Wilson, which the Board states extends to the entire device, is limited to the mower strip. It is only the mower strip that is mentioned as being flexible in order to aid installation. Hendrix has been cited for its teaching of a flexible retainer strip that is able to conform to the ground surface.

Wilson addresses the problems of arresting growth of grass between areas and watering plants without wetting sidewalks. Wilson lacks any suggestion or incentive to use its water conduit as a landscape retainer since this [**13] would arguably result in clogged sprinkler heads. n12 Wilson also [*1266] teaches that its mower strip is flexible in order to allow dirt to be packed thereunder. There is no suggestion in Wilson to extend that flexibility to the entire device. Wilson also lacks any teaching or suggestion that one should remove the anchoring leg. Hendrix does not, simply by virtue of its flexible nature, suggest these extensive changes which the Board states are obvious. Neither Wilson nor Hendrix, alone or in combination, provide any incentive to combine the teachings of the prior art in the manner maintained by the Board.

n12 This court has previously found a proposed modification inappropriate for an obviousness inquiry when the modification rendered the prior art reference inoperable for its intended purpose. *In re Gordon,* 733 F.2d 900, 902, 221 USPQ 1125, 1127 (Fed. Cir. 1984).

----------End Footnotes----------[HN4] -

"Obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching [**14] or suggestion supporting the combination. Under section 103, teachings of references can be combined *only* if there is some suggestion or incentive to do so." n13 Although couched in terms of combining teachings found in the prior art, the same inquiry must be carried out in the context of a purported obvious "modification" of the prior art. The mere fact that the prior art may be modified in the manner suggested by the Examiner does not make the modification obvious unless the prior art suggested the desirability of the modification. n14 Wilson and Hendrix fail to suggest any motivation for, or desirability of, the changes espoused by the Examiner and endorsed by the Board.

n13 *ACS Hosp. Systems, Inc. v. Montefiore Hosp.,* 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984).

n14 *In re Gordon,* 733 F.2d at 902, 221 USPQ at 1127.

Here, the Examiner relied upon hindsight to arrive at the determination of obviousness. [HN5] It is impermissible to use [**15] the claimed invention as an instruction manual or "template" to pieced together the teachings of the prior art so that the claimed invention is rendered obvious. n15 This court has previously stated that "one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention." n16

n15 *In re Gorman,* 933 F.2d 982, 987, 18 USPQ2d 1885, 1888 (Fed. Cir. 1991). *See also Interconnect Planning Corp. v. Feil,* 774 F.2d 1132, 1138, 227 USPQ 543, 547 (Fed. Cir. 1985).

n16 *In re Fine,* 837 F.2d at 1075, 5 USPQ2d at 1600.

Conclusion

The decision of the Board affirming the Examiner's rejection of independent claims 1, 13, 24, and 29 of

Fritch's application as unpatentable over the prior art under 35 U.S.C. § 103 is reversed. Since [HN6] dependent claims are nonobvious if the independent claims from which they depend are nonobvious, the Board's affirmance of the [**16] rejection of dependent claims 2-7, 9-12, 14-23, and 30 is also reversed. n17

n17 *In re Fine,* 837 F.2d at 1076, 5 USPQ2d at 1600 (citing *Hartness Int'l, Inc. v. Simplimatic Eng'g Co.,* 819 F.2d 1100, 1108, 2 USPQ2d 1826, 1831 (Fed. Cir. 1987)). *See also In re Sernaker,* 702 F.2d 989, 991, 217 USPQ 1, 3 (Fed. Cir. 1983) (when argued together, dependent claims stand or fall with the independent claims from which they depend).

REVERSED

LEXSEE 974 F.2D 1309

IN RE JOHN R. BEATTIE

91-1396

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

974 F.2d 1309; 1992 U.S. App. LEXIS 20945; 24 U.S.P.Q.2D (BNA) 1040

September 4, 1992, Decided

SUBSEQUENT HISTORY: Petition for Rehearing Denied and In Banc Suggestion Declined November 27, 1992, Reported at 1992 U.S. App. LEXIS 32144.

PRIOR HISTORY: [**1] Appealed from: U.S. Patent and Trademark Office. Board of Patent Appeals and Interferences

DISPOSITION: AFFIRMED

CASE SUMMARY:

PROCEDURAL POSTURE: Appellant inventor sought review of a decision of respondent Patent and Trademark Office Board of Patent Appeals and Interferences affirming the rejection of his claims of patent in a keyboard marker and a combination musical notation system as unpatentable due to obviousness.

OVERVIEW: The inventor combined traditional musical notation with a 12-tone numbering system of another's previous patent by superimposing the numbers over the traditional notes. The patent holder of this system rejected the use of the traditional musical notation as perplexing and irrational. The inventor also created a piano guide to place on the piano which indicated both systems. Another patent holder had invented the method of superimposing the numbers from his own system over the traditional notes which was used by the inventor. The Board rejected the patent for obviousness, and the court affirmed, holding that, as long as some motivation to combine the notations was provided by the prior art as a whole, the law did not require that the references be combined for the reasons contemplated by the inventor.

OUTCOME: The court affirmed the finding of obviousness by the Board, holding that the claimed patent simply combined the traditional seven-tone musical notation with its sharps and flats by marking the numbers of a 12-tone system of a previous patent over it.

LexisNexis(R) Headnotes

Civil Procedure > Appeals > Standards of Review > Clearly Erroneous Review
Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
[HN1] The United States Court of Appeals for the Federal Circuit reviews an obviousness determination by the U.S. Patent and Trademark Office Board of Patent Appeals and Interferences de novo. The court reviews underlying factual findings for clear error.

Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > Nonobviousness > Elements & Tests > Claimed Invention as a Whole
Patent Law > Nonobviousness > Evidence & Procedure > General Overview
[HN2] When determining the patentability of a claimed invention which combines two known elements, the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination.

Patent Law > Nonobviousness > Evidence & Procedure > General Overview
Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN3] In testing for obviousness, the combination need not have been done previously. As long as some

motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor.

COUNSEL: John R. Beattie, of New York, New York, argued Pro Se.

Jameson Lee, Associate Solicitor, Office of the Solicitor, of Arlington, Virginia, argued for appellee. With him on the brief was Fred E. McKelvey, Solicitor. Of counsel was Richard E. Schafer.

JUDGES: Before NIES, Chief Judge, ARCHER and CLEVENGER, Circuit Judges.

OPINIONBY: ARCHER

OPINION:

[*1310] ARCHER, Circuit Judge.

John R. Beattie (Beattie) appeals from the decision of the Patent and Trademark Office Board of Patent Appeals and Interferences (board), No. 91-0646, dated April 30, 1991, affirming the rejection of claims 1 through 7 in application Serial No. 07/300,488 as unpatentable under 35 U.S.C. § 103 (1988). We affirm.

BACKGROUND

A. The Invention

Beattie's application, entitled "Apparatus and Method for Reading and Playing Music on Keyboard or Stringed Instruments," claims a marker intended to rest on the keys of a piano or other keyboard or fretboard instrument and to facilitate the reading and playing of music. The marker consists of a horizontal and a vertical portion. Displayed on the horizontal portion is the traditional musical notation C [**2] D E F G A B corresponding to the seven tones of the diatonic scale played by the white keys that make up an octave on a piano. The vertical portion displays numbers, preferably 0 1 2 3 4 5 6 7 8 9 10 11, and corresponds to the twelve half-tones of the chromatic scale played by the white and black keys that together make up an octave. Claim 1 reads:

A marker adapted for use in a basic instructional method for facilitating the reading and playing of music on a keyboard instrument having a standard keyboard with twelve keys per octave of which seven are white and five are black, said marker comprising a body portion formed from a thin material and adapted to rest vertically behind the black keys and upon the white keys of said keyboard instrument, said body portion having displayed thereon in vertical register [*1311] with each of said twelve black and white keys a number representing dodecatonically the chromatic semitone pitch sounded by each said black and white key, and tabs extending horizontally forward from the lower edge of said body portion and registering with each of said seven white keys, each of said horizontal tabs having displayed thereon the letter designation C, D, E, F, [**3] G, A, or B representing heptatonically the diatonic scale degree pitch sounded by each said white key, the said vertical twelve dodecatonic number designations juxtaposed with the said horizontal seven heptatonic letter designations giving linear and regular expression to the chromatic semitone twelve-pitch structure of the keyboard and of music and, simultaneously, linear and regular expression to the diatonic scale degree seven-pitch structure of the keyboard and of music, said marker adapted to be used in combination with a method of display for written music which likewise gives linear and regular expression to both chromatic semitone twelve-pitch structure and diatonic scale degree seven-pitch structure simultaneously through superimposition of the dodecatonic numbers upon the traditional heptatonic noteheads.

B. The Prior Art

United States Patent No. 1,725,844 to Barnes discloses a marker corresponding to a keyboard with a horizontal portion displaying traditional alphabetical notation and a vertical portion displaying that alphabetical notation plus attendant sharps and flats: C; C-Sharp or D-Flat; D; D-Sharp or E-Flat; E; F; F-Sharp or G-Flat; G; G-Sharp or A-Flat; [**4] A; A-Sharp or B-Flat; B.

United States Patent No. 566,388 to Eschemann teaches a musical marking system with a lower register displaying the traditional seven letters on the white keys and those letters with attendant sharps and flats on the black keys of the octave and an upper register with a numerical rather than alphabetical notation. Specifically, the traditional letters are represented as numbers one through seven with attendant sharps and flats indicated as those numbers outlined to correspond to the twelve tones of the octave: 1 1 2 2 3 4 4 5 5 6 6 7.

United States Patent No. 608,771 to Guilford discloses a system of musical notation that identifies the series of twelve half-tones of the chromatic scale with numbers 1 2 3 4 5 6 7 8 9 10 11 12. Guilford characterizes alphabetical notation with sharps and flats as "perplexing and irrational."

C. The Rejection

The board affirmed the examiner's rejection of claims 1 through 7 under 35 U.S.C. § 103 as obvious in view of the combined teachings of Barnes, Eschemann and Guilford. Because the claims are not separately argued, they stand or fall together. In re Kaslow, 707 F.2d 1366, 1376, 217 USPQ 1089, 1096 (Fed. Cir. 1983); [**5] In re Albrecht, 579 F.2d 92, 93-94, 198 USPQ 208, 209 (CCPA 1978). The board concluded that Eschemann taught a marking system displaying a combination of two different notations,viz., alphabetical and numerical, and then determined that it would have been obvious to substitute the 1 2 3 4 5 6 7 8 9 10 11 12 numerical notation of Guilford for the 1 1 2 2 3 4 4 5 5 6 6 7 numerical notation of Eschemann.

DISCUSSION

I.

[HN1] This court reviews an obviousness determination by the board de novo, while we review underlying factual findings for clear error. In re Woodruff, 919 F.2d 1575, 1577, 16 USPQ2d 1934, 1935 (Fed. Cir. 1990). What a reference teaches is a question of fact. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1579 n.42, 1 USPQ2d 1593, 1606 n.42 (Fed. Cir. 1987). [HN2] When determining the patentability of a claimed invention which combines two known elements, "the question is whether there is something in the prior art as a whole to suggest the desirability, and thus the obviousness, of making the combination." Lindemann Maschinenfabrik [*1312] GMBH v. American Hoist & Derrick Co., 730 F.2d 1452, 1462, 221 USPQ 481, 488 (Fed. Cir. 1984). [**6]

II.

In his specification, Beattie refers to the alphabetical designation C D E F G A B as a heptatonic representation of the diatonic scale degrees and the numerical designation 1 2 3 4 5 6 7 8 9 10 11 12 as a dodecatonic representation of the chromatic semitones. These two theories combined on a single marker achieve, in Beattie's words, a "mutual reinforcement of the advantages inherent in each approach, permitting both types of scales, the diatonic and the chromatic, to appear as smooth progressions, easy for students to visualize and understand."

There is no dispute that Barnes and Eschemann each disclose the heptatonic theory and that Guilford teaches the dodecatonic theory such that Guilford's notation substituted on the upper register of the marking systems of either Barnes or Eschemann describes the claimed invention. The question here is whether the board correctly held that it would have been obvious to one having ordinary skill in the art to combine the references in order to meet the claimed invention. Beattie contends that the board, in arriving at its conclusion of obviousness, did not accord due weight to the notion that Guilford teaches away from the claimed combination [**7] and that the declarations of seven music teachers provide convincing evidence of nonobviousness of the invention.

Eschemann displays on the lower register of his marking system the traditional letters alone and those letters with attendant sharps and flats for "those familiar with the ordinary musical notation." On the upper register, Eschemann displays 1 1 2 2 3 4 4 5 5 6 6 7 "for those unfamiliar with the theory of music." Eschemann, then, provides the suggestion to retain traditional alphabetical notation when introducing a new numerical notation.

Guilford teaches the advantages of a dodecatonic twelve tone music theory over the traditional heptatonic seven and twelve tone music theories. Specifically, Guilford discloses the deficiencies of traditional music theory of twelve tones based on a notation system having only seven intervals thus requiring five sharps and flats. He arrives at a "simple and rational" solution by utilizing the uniform series of numbers 1 2 3 4 5 6 7 8 9 10 11 12 instead of the "perplexing and irrational" system of C, C#/Db, D, D#/Eb, E, F, F#/Gb, G, G#/Ab, A, A#/Bb, B. This reference suggests the desirability of implementing a simple numerical alternative [**8] to the complex alphabetical music notation.

Armed with a reference teaching the old alphabetical notation on a marking system with a new numerical notation in one hand and a reference teaching a different numerical notation in the other hand, the obviousness of substituting Guilford's numerical twelve tone system for Eschemann's numerical twelve tone system to arrive at Beattie's claimed invention is clearly established.

Although Guilford's twelve tone theory is said to be "dodecatonic" while Eschemann's twelve tone theory is said to be "heptatonic," as Beattie defines those terms, the absence of a single express teaching of a marker with the two theories combined does not make impossible a sound prima facie case of obviousness. [HN3] As long as some motivation or suggestion to combine the references is provided by the prior art taken as a whole, the law does not require that the references be combined for the reasons contemplated by the inventor. In re Kronig, 539 F.2d 1300, 1304, 190 USPQ 425, 427-28 (CCPA 1976); In re Lintner, 59 C.C.P.A. 1004, 458 F.2d 1013, 1016, 173 USPQ 560, 562 (CCPA 1972).

Moreover, Guilford's endorsement of [**9] a dodecatonic twelve tone notation over the traditional twelve tone notation does not establish a teaching away from the older system such that Guilford cannot be combined with Eschemann. Guilford merely presents an

alternative to a well-entrenched musical theory, which, of course, he considers better and urges as a replacement. The recommendation of a new musical [*1313] notation system, however, does not require obliteration of another; coexistence of the teachings of Guilford and traditional musical notation for nearly a century bears this out.

III.

Beattie's final argument on appeal is that the declaration evidence supports his position that the claimed invention is nonobvious. The seven declarations of musicians and music teachers submitted under 37 C.F.R. § 1.132 generally praise Beattie's invention, opine that Guilford teaches away from the claimed invention and conclude that the invention would not have been obvious. It is unquestioned that such evidence must be considered, In re Piasecki, 745 F.2d 1468, 1471, 223 USPQ 785, 787 (Fed. Cir. 1984), and may be sufficient to overcome a prima facie case of obviousness. Id. at 1472, 223 USPQ at 788, [**10] (quoting In re Surrey, 50 C.C.P.A. 1336, 319 F.2d 233, 235, 138 USA 67, 69 (CCPA 1963)). In this case, however, the board properly considered all the rebuttal evidence and arguments and determined that they were insufficient to establish nonobviousness in the face of the very strong prima facie case of obviousness. See In re Lindell, 55 C.C.P.A. 707, 385 F.2d 453, 456, 155 USPQ 521, 524 (CCPA 1967).

Specifically, the board noted that the Eschemann reference was not a part of the rejection at the time the declarations were prepared, concluded that the declarations failed to show a long felt need and failure of others to meet that need as urged, and stated that the declarations themselves offer only opinion evidence which has little value without factual support. We are not persuaded that the board erred in determining that the declarations were insufficient to establish nonobviousness.

AFFIRMED

DISSENTBY: CLEVENGER

DISSENT:

CLEVENGER, Circuit Judge, dissenting respectfully.

The majority quite rightly identifies the dispositive issue in this case: whether there is a legally sufficient reason to combine the Guilford reference with the other cited prior art, thereby rendering [**11] Beattie's claims prima facie obvious. That issue, of course, cannot be responsibly addressed without examining the teachings of the prior art.

We all agree that without the dodecatonic -- i.e., twelve equal tone -- system of notation found in the Guilford reference Beattie's claims are not unpatentable under section 103. This is so because Beattie claims the combination of two radically different systems of musical notation on a single marker, not the mere mixing of numbers and letters on a marker to express the same system of notation. The majority correctly points to nothing in the Eschemann or Barnes references that would provide a suggestion to combine them with Guilford. The majority cannot find such a suggestion in the Eschemann or Barnes markers because both registers of these markers are written in heptatonic notation, i.e., with seven primary tones and five secondary tones. There is no indication in either reference that these markers should or could incorporate the dodecatonic notation disclosed in Guilford. Consequently, if Guilford is to be combined with either Eschemann or Barnes, it is because Guilford provides the requisite suggestion.

What Guilford [**12] teaches is a question of fact. Panduit Corp. v. Dennison Mfg. Co., 810 F.2d 1561, 1579 n.42, 1 USPQ2d 1593, 1606 n.42 (Fed. Cir.), cert. denied, 481 U.S. 1052, 95 L. Ed. 2d 843, 107 S. Ct. 2187 (1987); Ashland Oil, Inc. v. Delta Resins & Refractories, Inc., 776 F.2d 281, 297 n.24, 227 USPQ 657, 667 n.24 (Fed. Cir. 1985), cert. denied, 475 U.S. 1017, 89 L. Ed. 2d 315, 106 S. Ct. 1201 (1986). whether Guilford teaches toward combination with other prior art, or away from such combination is also a question of fact, Raytheon Co. v. Roper Corp., 724 F.2d 951, 960-61, 220 USPQ 592, 600 (Fed. Cir. 1983), cert. denied, 469 U.S. 835, 83 L. Ed. 2d 69, 105 S. Ct. 127 (1984), not a mere "notion" as the majority holds today for the first time. These factual questions go to the core of the obviousness analysis.

[*1314] Guilford itself and seven declarations from persons skilled in the art of music teaching are the only factual evidence in this case addressing whether Guilford teaches toward or away from combination with the Eschemann or Barnes references. Let us first examine Guilford and then turn your attention to the declarations.

The system of [**13] notation Guilford discloses is, in a word, distinct. For example, Guilford writes the first and last four measures of "Home Sweet Home" thus:

[SEE MEASURES OF "HOME SWEET HOME" IN ORIGINAL]

Guilford describes traditional pitch notation as "a perplexing and irrational system of sharps, flats, and naturals" such that "the same tone has many different symbols." He finds the traditional five line staff bothersome because it notates, at most, only one and one-third octaves of the more than seven octave musical range. The traditional staff

necessitates the use of a greater or less number of ledger-lines above and below the staff, thus needlessly increasing the work of composition for the type-setter, besides consuming a large part of the page for only a few measures of the music, and, worse than all, it adds greatly to the difficulty of reading the music itself.

Guilford also states that "the present notation is just as defective in its means for expressing time as it is in its means for expressing pitch." He finds the current system of notation "illogical" and that it does not express the modern conception of musical time. Guilford emphasizes that he "employ[s] a single uniform [**14] series of note-symbols" and that "the use of all so-called 'accidentals' [sharps, flats and naturals] is rendered wholly unnecessary." Guilford dramatically sums up his invention stating:

with a view to overcoming the above deficiencies, crudities, and other faults as well I have devised a new notation which affords a simple and adequate means for expressing pitch, accent, and duration, which are the elements of modern music.

Guilford more than fails to suggest using the traditional system of notation in combination with his own system of notation as Beattie has done. Rather, Guilford actively rejects the traditional alphabetical notational system and proposes his system as a replacement. In so doing, Guilford removes any basis of finding a suggestion to combine his system of notation with any other system, including the traditional alphabetic system of notation used in the lower portions of both the Eschemann and Barnes markers.

The Board did not examine these unmistakable teachings of Guilford. Instead, it merely asserted that an artisan would have seen the need to merge Guilford with the other prior art. The Board thus committed clear error by misreading the factual content [**15] of the prior art.

When addressing the declaration evidence, the Board recognized that "each affidavit [contains] . . . discussions . . . that Guilford teaches away from [combination]," but dismissed the affidavits because they contained conclusions on the ultimate legal issue of obviousness as well. I do not quibble with the Board's or the majority's rejection of the experts' conclusions on the ultimate legal issue. The Board and the majority, however, are not free to ignore declarations in the record from music experts who all agree that the seven-tone [*1315] approach to music and the twelve-tone approach to music are two incompatible concepts. In these declarations, the experts state, in part:

Although it is well known that music can be thought of as based on seven tones and it can also be thought of as based on twelve tones, Mr. Beattie is carrying this an important step further by showing how to combine the two schools of thought . . . . It appears to me that this is a significant attempt to combine two separate trends in music which had previously been assumed to be irreconcilable. . . . The bias in Guilford is clearly toward doing away with all seven tone orientation, not toward [**16] finding ways to keep it around. . . . This, in my view, shows [Guilford's] desire to eliminate any vestige of seven-orientation from his system which is the exact opposite of the seven-twelve reconciliation which Mr. Beattie discloses. (Joel Mandelbaum, Professor of Music, Queens College.)

Since inventor Guilford's twelve semitone numbers per octave stand all by themselves, and are not correlated in any way with the conventional seven scale degrees, it is clear to me that his objective was to discard the old seven-based system and replace it completely with his new twelve-based system, not combine the two. He offers positively no discussion or hint of making a "heptatonic/dodecatonic" combination. In fact the opposite is true, because he specifically says (page 2, line 93) that his system will make the use of accidentals "wholly unnecessary", which is to say [Guilford] advocates eliminating the seven-based system from consideration. (Lawrence Widdoes, music instructor, The Julliard School at Lincoln Center.)

[Guilford] appears to have been engaged in a crusade to stamp out the traditional system with its "perplexing and irrational system . . . ." (Paul Sheftel, music teacher, [**17] author, lecturer, pianist and composer.)

It is fairly evident that Guilford intends his numerical arrangement to supersede, not reinforce, the traditional diatonic system with its sharps and flats which he describes as "perplexing and irrational" (p.1, lines 25 and 26), and in fact this is a goal similar to that of the twelve-number systems used by music theoreticians . . . . (L. Poundie Burstein, faculty member at The Mannes College of Music and Preparatory School and teacher at Queens College.)

Teachings of the prior art simply cannot be combined when the prior art contains no suggestion or motivation to combine them. ACS Hosp. Sys., Inc. v. Montefiore Hosp., 732 F.2d 1572, 1577, 221 USPQ 929, 933 (Fed. Cir. 1984). There can be no motivation or suggestion to combine when the prior art in fact teaches away from any combination.

In the face of uncontroverted materially dispositive factual evidence to the contrary, the majority zestlessly

declares, ipse dixit, as did the Board, that it is obvious to combine Guilford with Eschemann. It never tells you why its conclusion might otherwise be correct. Furthermore, the majority simply avoids the [**18] factual evidence in the record that precludes combination. Rather than come to grips with the factual support the declarations provide for the proposition that Guilford teaches away from combination, the majority simply dismisses the declarations in their entirety as an unsuccessful effort to overcome a prima facie case of obviousness. Just because the declarations address matter pertinent to "secondary considerations", see Graham v. John Deere Co., 383 U.S. 1, 17-18, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966), does not justify calculated avoidance of all other pertinent factual assertions contained therein. Even the Board recognized that the declarations speak to the teaching away issue. Guilford tells the examiner, the Board and the majority not to combine his system of notation with the traditional system he despises, and those skilled in the art agree that Guilford teaches away from combination. These are facts that cannot be ignored.

The majority concludes that Beattie faced a "very strong prima facie case of obviousness." There can be no such case here unless someone can find in "the prior art taken as a whole" the suggestion to [*1316] combine Guilford with the other prior art. The mere [**19] conclusory approach of the Board, which the majority leaves undisturbed, is unconvincing. I submit that Beattie provided the motivation to combine the two systems of notation. His genius resides in combining two hitherto alien systems of musical notation on one marker. Perhaps "simple as pie," but not obvious under section 103.

I am at a loss to understand why the majority seems compelled to affirm the clearly erroneous decision of the Board. This court regularly upsets trial court judgments of Article III judges when they fail to consider correctly the Pertinent facts. See, e.g., Read Corp. v. Portec, Inc., 970 F.2d 816 (Fed. Cir. 1992) (reversing district court denial of JNOV because jury verdict of willful infringement unsupported by substantial evidence); Laitram Corp. v. Rexnord, Inc., 939 F.2d 1533, 1539, 19 USPQ2d 1367, 1372 (Fed. Cir. 1991) (reversing district court because conclusory assertions of infringement insufficient); Eli Lilly & Co. v. Medtronic, Inc., 915 F.2d 670, 673-74, 16 USPQ2d 2020, 2023 (Fed. Cir. 1990) (reversing district court because factual findings insufficient [**20] to establish violation of injunction). Why we should treat the Board of Patent Appeals and Interferences differently is a mystery to me.

Given the choice of crediting the unsupported conclusion of my colleagues or the unmistakable teaching of Guilford and the unchallenged factual statements of experts skilled in an esoteric art, I must part company with my colleagues.

LEXSEE 270 F.2D 810

IN RE FERDINAND J. RATTI

No. 6452

United States Court of Customs and Patent Appeals

46 C.C.P.A. 976; 270 F.2d 810; 1959 CCPA LEXIS 162; 123 U.S.P.Q. (BNA) 349

Oral argument May 8, 1959

September 30, 1959

PRIOR HISTORY: [***1]

APPEAL from Patent Office, Serial No. 359,325

DISPOSITION:

REVERSED.

CASE SUMMARY:

PROCEDURAL POSTURE: Appellant applicant sought review of an order from the United States Patent Office Board of Appeals rejecting appellant's claims for a patent.

OVERVIEW: Appellant applicant sought review of an order from the board rejecting appellant's claims for a patent. The district court reversed the board's decision. The district court held that an applicant was entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applied. According to the court, the statutory requirements for patentability, broadly stated, were novelty, usefulness and unobviousness, as provided in 35 U.S.C.S. § § 101, 102, and 103. The district court then held that the board committed error when it considered matters outside of § § 101, 102 and 103. The district court held that the intent of Congress was that patentability was to be determined solely by the provisions of § § 101, 102, and 103.

OUTCOME: The district court reversed the board's decision holding that an applicant was entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applied.

LexisNexis(R) Headnotes

Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
Patent Law > Anticipation & Novelty > General Overview
[HN1] Novelty alone is no proper basis for the allowance of a claim.

Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
Patent Law > Anticipation & Novelty > General Overview
Patent Law > Statutory Bars > General Overview
[HN2] An applicant is entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applies.

Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
Patent Law > Anticipation & Novelty > General Overview
Patent Law > Nonobviousness > General Overview
[HN3] The statutory requirements for patentability, broadly stated, are novelty, usefulness and

unobviousness, as provided in 35 U.S.C.S. § § 101, 102, and 103.

Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
Patent Law > Infringement Actions > Infringing Acts > General Overview
[HN4] While it is true that proof that an invention is better or does possess advantages may be persuasive of the existence of any one or all of the foregoing three requirements, and hence be indicative of patentability, Congress has not seen fit to make such proof a prerequisite to patentability.

Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
Patent Law > Anticipation & Novelty > General Overview
Patent Law > Nonobviousness > General Overview
[HN5] The intent of Congress is that patentability be determined solely by the provisions of 35 U.S.C.S. § § 101, 102, 103.

COUNSEL:

Cromwell, Greist & Warden (Raymond L. Greist of counsel) for appellant.

Clarence W. Moore (S. Wm. Cochran of counsel) for the Commissioner of Patents.

OPINIONBY:

SMITH

OPINION: [**810]

[*977] Before WORLEY, Chief Judge, and RICH, MARTIN and SMITH, Associate Judges, and Judge WILLIAM H. KIRKPATRICK n1

n1 United States Senior District Judge for the Eastern District of Pennsylvania, designated to participate in place of Judge O'Connell, pursuant to the provisions of Title 28, United States Code, Section 294(d).

SMITH, Judge, delivered the opinion of the court:

This is an appeal from the decision of the Board of Appeals of the United States Patent Office affirming the rejection by the Primary Examiner of claims 1, 4, 7, and 10 of appellant's application serial No. 359,325, filed June 3, 1953, for a patent on an "Oil Seal" for sealing the space between a bore in a housing and a relatively movable shaft centrally located in the bore.

Claim 1 is representative of claims 4 and 7 and reads:

1. A seal for insertion in a cylindrical bore in a housing about a relatively movable centrally located [***2] shaft, comprising an annular bore-engaging mounting portion of resiliently deformable material for endwise insertion in and statically sealed engagement with the bore in the housing, an annular shaft-engaging portion connected with said bore-engaging portion for running engagement with the shaft, and a metal ring located adjacent one end of said bore-engaging portion, said ring being provided with a plurality of axially extending outwardly biased spring fingers in outwardly clamped engagement with said bore-engaging portion inwardly of the outer periphery of the latter, and said ring being also provided outwardly of said bore-engaging portion with means for detachably connecting the ring to the housing outwardly of the bore in the latter. [Emphasis ours.]

[*978] Claim 10 differs from the other claims on appeal and reads:

10. A seal for insertion in a cylindrical bore in a housing about a relatively movable centrally located shaft, comprising a sealing ring having an outer bore-engaging portion of resiliently deformable material, which portion is of somewhat larger diameter than the bore in the housing, for press-fit insertion in the bore, and a metal retaining ring associated [***3] with the sealing ring, said retaining ring being connected with [**811] the sealing ring and being provided outwardly of the latter with resiliently yieldable hook formations which are adapted to be sprung into interlocking engagement with a complementary formation associated with the housing outwardly of the bore, which engagement acts to prevent axial displacement of the sealing ring relative to the bore in the housing. [Emphasis ours.]

The references in the case are:

Roth, 1,546,942, July 21, 1925.

Norton, 1,951,034, March 1, 1934.

Jepson, 2,544,324, March 6, 1951.

Chinnery et al. (British), 578,526, July 2, 1946.

Appellant's shaft seal comprises an annular sealing member of resilient deformable material which is adapted to be inserted into a cylindrical bore surrounding a relatively movable shaft. The inner portion of the sealing member is provided with a flexible lip which is held in engagement with the shaft by a garter spring. In the outer portion of the sealing member, an annular slot is provided which is concentric with and spaced from the outer periphery of the sealing member. This slot extends

axially from the end of the member and provides a pocket [***4] in which the axially extending outwardly biased spring fingers of a metallic attaching ring are located. This construction permits the spring fingers to exert a force on the resilient material in the direction of the annular wall of the bore to provide and maintain a snug engagement between the outer surface of the resilient member and the inner surface of the bore. The metallic attaching ring is also provided with radially extending resilient hooks located outwardly of the bore engaging portion of the resilient member. The housing is provided with a complementary formation outwardly of the bore which is engaged by the resilient hooks to provide a snap-on connection between the bore and the seal.

The Roth and Norton patents were relied upon by the examiner in rejecting claim 10, and since both references were considered by the board, we have included them in our consideration of this case. Roth shows a gasket structure for steam train line hose couplings. Norton shows an adjustable repair clamp for bell and spigot joints in which there is provided a sheet metal bridge piece "preferably of spring material." The bridge piece is sprung into interlocking engagement with a structural [***5] portion of the clamp and exerts its [*979] force on a resilient packing ring which, if desired, may be cemented to it.

The Chinnery et al. patent is the reference principally relied upon by the Patent Office. It shows a housing provided with a bore surrounding a centrally located shaft. A reinforced and "stiffened" sealing member formed of a material such as rubber, is press fitted into the space between the bore and the shaft. The sealing member has an inner lip held in contact with the shaft by a garter spring. The bore engaging portion of the sealing member is "stiffened" by an axially extending cylindrical sheet metal casing which acts as a reinforcing member for a definite purpose which is described by Chinnery et al. as follows:

Owing to the limited radial space within which the oil seal is to be accommodated, the holding portion of the oil seal cannot be stiffened by being massive. Consequently the holding portion of the present oil seal is stiffened in the known manner by a reinforcement, which may either encase or line, or alternatively constitute, such holding portion and therefore makes the pressfitting contact with the machine part stationary relatively thereto, [***6] or may be an internal reinforcement in the [**812] sense that it does not make press-fitting contact with the machine part stationary relatively thereto. [Emphasis ours.]

In Fig. 8 Chinnery et al. shows a radially extending flange at the outer edge of a reinforcing member of the internal reinforcement type which flange extends beyond the sealing member "to such an extent as to serve as a means of attachment of the oil seal to the housing i, additional to the interference press fit of the holding portion a in the housing recess g." The aforesaid flange is shown attached to the housing by screws or bolts.

The Jepson patent relates to a gasket for sealing the space between the upper and lower vessels of a vacuum-type coffee maker. The gasket is an annular rubber member attached to the lower part of the upper vessel and is designed to fit into the upper part of the lower one.Located in a groove in the gasket is a sleeve member provided with axially and downwardly extending spring fingers which are so biased radially as to urge the lower peripheral portion of the gasket outwardly, thus effecting a tight engagement with the mouth of the lower vessel.

Claims 1, 4, and 7 stand [***7] rejected on Chinnery et al. in view of Jepson, on the ground that it would not require "invention" to replace the cylindrical sheet metal reinforcing member, which is secured to the Chinnery et al. sealing member, by by an annular set of outwardly biased spring fingers shown by Jepson.

The problems which were solved by appellant's invention existed in this art at the time of his invention despite the Chinnery et al. disclosures. It was appellant rather than Chinnery et al. who provided [*980] the art with a shaft seal in which the resilient element of the seal could be readily inserted into a bore in the housing so that it could be removed from the bore and replaced by a new sealing element without mutilation of the sealing surface of the bore. This is particularly important, the specification points out, where the bore is formed in light metal alloys such as are used in aircraft engines and which are relatively soft and easily damaged. In appellant's oil seal, the resilient seal is so constructed that when mounted in the bore, it will establish and maintain a fluid tight relationship between the outer peripheral surface of the resilient seal member and the inside of the [***8] bore. Where either natural or synthetic rubber is used as the resilient sealing member in such seals, the rubber in time will take a set or lose its resiliency at least to the extent that the seals soon become ineffective to prevent leakage of oil. When subjected to mechanical pressures and heat, such a rubber sealing element loses its sealing effectiveness at an accelerated rate. The problems in the oil sealing art arising from such use of resilient sealing elements appear to have persisted because of the failure of the art to recognize these characteristics of the rubber sealing element and to so design the resilient element and the mounting therefor as to assure holding the outer circumference of the resilient sealing element in static oil-sealing contact with the inner circumference of the bore in which it is inserted.

Appellant's seal differs from the art of record in at least three respects:

(1) The provision of the annular slot which extends axially inward from one end of the resilient sealing element. This feature is claimed as part of the combination set forth in claim 4.

(2) The outwardly biased resilient spring means or fingers inserted in the resilient sealing [***9] element. These means are claimed as part of the combination of claims 1, 4, and 7.

(3) The "snap-on" connector which holds the resilient sealing element and engages with a complementary formation associated with the housing outwardly of the bore. This feature is in the combination of claim 10.

The patents cited by the examiner, either alone or in combination, do not disclose a resilient shaft sealing element having these features.

[1] It is common knowledge that resilient deformable materials such as either natural or synthetic rubber are [**813] incompressible, that is, while they may be deformed, this can occur only if the design and mounting of the part permits the resilient material to change its shape in response to the applied forces.

[*981] The seal construction disclosed in Chinnery et al. is such that the "interference press fit" which that patent calls for is alone relied on to keep the seal tight. There is nothing in the Chinnery et al. patent to show how the resilient sealing element is maintained in resilient contact with the bore otherwise than by the resiliency of the rubber. If and when that resiliency is lost, the sealing effect will be impaired. [***10]

Considering the incompressible nature of the rubber in the sealing element disclosed in Chinnery et al., its stiffening and reinforcement by the cylindrical sheet metal member, and its "interference press fit" in the bore, it seems clear to us that the Chinnery et al. seal cannot function in the manner of appellant's seal. Now, as to the contention that Jepson would suggest inserting a set of spring fingers, the resilient element of Chinnery et al. is forced so tightly into the bore and is so "stiffened" that the use of the resilient spring fingers of Jepson could not possibly increase the resilient deformation of the Chinnery et al. seal in the direction of the bore or increase the sealing engagement of the seal with the bore. The teaching of the Chinnery et al. patent points away from the addition of any spring element. On the other hand, we find nothing in the disclosure of Jepson's coffee maker gasket to suggest that any part of it has applicability to shaft seals. The two arts are at least somewhat remote from each other even if they both involve sealing.

We, therefore, find that Chinnery et al. did not teach the shaft sealing art how to solve the problems which existed [***11] in that art at the time of appellant's invention. [2] We hold, further, that the combination of Jepson with Chinnery et al. is not a proper ground for rejection of the claims here on appeal. This suggested combination of references would require a substantial reconstruction and redesign of the elements shown in Chinnery et al. as well as a change in the basic principles under which the Chinnery et al. construction was designed to operate.

Once appellant had taught how this could be done, the redesign may, by hindsight, seem to be obvious to one having ordinary skills in the shaft sealing art. However, when viewed as of the time appellant's invention was made, and without the benefit of appellant's disclosure, we find nothing in the art of record which suggests appellant's novel oil seal as defined in claims 1, 4, and 7.

We shall now consider the rejection of claim 10, remarking first that it differs from claims 1, 4, and 7 in that it is directed to a combination of a housing bore, a resilient sealing ring and a metal retaining ring connected to the sealing ring, wherein the metal ring has resilient hooks which secure the seal in the bore. This claim is not limited to the [***12] outwardly biased spring fingers.

[*982] The examiner rejected claim 10 on two grounds: (1) that substitution for the screw securing means of Chinnery et al. of a series of spring hooks such as disclosed by Norton would not involve patentable invention, and (2) unpatentability over Roth.

[3] We shall first dispose of the second rejection. The board held that claim 10 is drawn to a combination of a sealing ring and a housing bore in which the sealing ring is detachably placed and that Roth discloses nothing of this nature. The board therefore reversed the rejection on Roth and consequently it is not before us.

As to the first rejection, the board recognized that it was on the ground of unpatentability "over Chinnery et al. in view of Norton" and pointed out that the examiner could see nothing patentable in substituting spring hook attaching means shown in Norton for the screws of Chinnery et al. It then said:

Appellant argues that the references fail to suggest or teach how the proposed [claimed] combination could be made and after a careful consideration of the references, we [**814] have concluded that he is correct in this respect. We therefore concede [***13] that the claim * * * defines novelty over the disclosure of Fig. 8 of Chinnery et al. [HN1] Novelty alone however, is no proper basis for the allowance of a claim. [Emphasis ours.]

Although, in reaching this conclusion, the board made no reference to Norton, the context compels the conclusion that novelty was found notwithstanding the disclosure of Norton, taken together with Chinnery et al. [4] We fully agree, of course, with the board's statement that novelty alone is not enough for patentability.

With the next statement of the board, in explanation of its affirmance of the rejection of claim 10, we do not agree. It reads:

In order to properly define invention [meaning, of course, patentable invention], a claim should clearly define a structure which possesses some definite advantage over the prior art. As far as we can determine there is no better combination of housing and seal produced by using a series of snap fastener connections to connect the seal to the housing, as in appellant's structure, over using a series of bolts, as in the structure shown by Chinnery et al. Both act to merely detachably connect one element to another element and as far as we can find are [***14] merely equivalent connecting means especially in the absence of any unexpected result or advantage being obtained, by using one means in preference to the other, on which the record before us is entirely silent. [Emphasis ours.]

If we may extract from the foregoing what we understand to be the essence of the board's position in the matter, it is that claim 10 is not patentable, though it defines a combination which is novel over the disclosures of the references, because the claimed combination has not been shown to be any better than, or to possess any advantage over, what was known to the art.

[*983] As was pointed out in In re Stempel, Jr., 44 C.C.P.A. 820, 241 F.2d 755, 113 USPQ 77, [5] [HN2] an applicant is entitled to a patent, under the statutes, unless one of the prohibitory provisions of the statutes applies. [6] [HN3] The statutory requirements for patentability, broadly stated, are novelty, usefulness and unobviousness, as provided in 35 U.S.C. sections 101, 102, and 103.While [HN4] it is true that proof that an invention is better or does possess advantages may be persuasive of the existence of any one or all of the foregoing three requirements, and hence be indicative [***15] of patentability, Congress has not seen fit to make such proof a prerequisite to patentability. n2

> n2 A critical essay on the existing law has recently appeared under the title "A Proposal for: A Standard of Patentability; Consonant Statutory Changes; A Manual on Determination of Patentability," by Malcolm F. Bailey, 41 J.P.O.S. 192-225, 231-257. It advocates, as we understand it, that the present law should be changed to set up as the test for patentability, in place of the requirement of section 103 that an invention be unobvious, a requirement that the invention involve progress, which the author finds in the constitutional provisions. Congress has not seen fit to include in the statutes, at any time during the past 169 years so far as we are aware, a requirement that each and every patentable invention shall involve "progress" in this sense, i.e., that each new invention must also be shown to possess some definite advantage over the prior art. The author relates the term "progress" to individual inventions and then gives it the connotation that each such invention should be a technical advance, improvement or betterment. The very making of the suggestion to change the law is an indication that the existing law is otherwise. [***16]

Appellant's invention, as defined in claim 10, has been held by the board to possess novelty over the disclosure of Chinnery et al. Just what the board thought about the pertinency of Norton is obscure but it seems to have regarded this reference as of little moment. Appellant in his brief here said that Norton was held by the board to have no bearing on the invention and the Patent Office brief said that the appellant was correct [**815] in so stating and that the court need not consider it. We are, therefore, virtually without any reference against claim 10 except Chinnery et al. and the rejection thereon is predicated solely on a theory of patentability we find to be outside of the patent statutes, namely, that the combination of claim 10 is, by reason of the use of spring retaining hooks instead of a series of bolts, no better than the combination of Chinnery et al. However intriguing such a ground of rejection may be, [7] it is the duty of the tribunals of the Patent Office and of this court to apply the law as Congress has written it. While the provisions of the former R.S. 4893 may be said to have given the Commissioner some discretion in refusing to grant a patent [***17] on an otherwise patentable invention unless "the same is sufficiently useful and important," when the Patent Codification Act of 1952 was enacted, Congress removed this provision from old section 36 of title 35, new section 131. We take this as a further indication that it is [HN5] the intent of Congress that patentability be determined solely [*984] by the provisions of sections 101, 102, 103. We therefore reverse the board on this ground of rejection of claim 10.

If the issue before us were whether or not the spring hooks are better than the Chinnery et al. bolts - and we consider this in the event we have misapprehended the position of the board - we would hold that they are, on the basis of what is disclosed in the application. This

retaining means seems to possess many advantages over screws. Similarly, if the board was intending to say that the hooks and the bolts are merely equivalent connecting means and that claim 10 is unpatentable because its combination differs from the prior art only in the substitution of an equivalent for one element in an old combination, then we would also have to disagree since we think it is clear that the use of the spring hooks produces a [***18] result quite different from the bolts of Chinnery et al. On the record before us no reference relied on shows any spring hooks nor does it contain any support for the contention that bolts and spring hooks are equivalents.

For the foregoing reasons we reverse the rejection of claim 10.

The rejections of claims 1, 4, 7, and 10 are reversed.

MARTIN, J., concurs in result.

DISSENTBY:

KIRKPATRICK

DISSENT:

KIRKPATRICK, J., dissenting, in which Worley, C.J., joins.

I think that the board's rejection of claims 1, 4, and 7 should be affirmed. The central idea and the most important feature of these three claims, as well as of allowed claim 5, is the exertion of outwardly directed pressure upon the bore engaging portion of the sealing member, the result accomplished being to counteract the tendency of rubber to "set" or lose its resiliency and so become ineffective to prevent leakage. Jepson comes very close to completely anticipating this feature of the patent. All that would be necessary to make the anticipation complete would be to provide the Jepson seal with a shaft engaging portion and, incidentally, claim 7 does not specify any shaft engaging portion.

Of course, it was necessary [***19] that the seal be attached to the bore in a manner to prevent its displacement. Chinnery provides a flange and screws for this purpose and none of the three claims referred to calls for anything more specific than "means." Thus it seems clear that claims 1, 4, and 7 show no patentable novelty as against the prior art of Chinnery plus Jepson.

The only question is whether Jepson is in a nonanalogous art sufficiently remote from that of the application to put it beyond the probability that it would be considered by persons skilled in the art [*985] endeavoring to solve the problem to the solution of which the application is directed. I do not think that it is. Jepson was trying to meet exactly the same problem as the application under consideration, namely, to provide a compressible [**816] seal which could be readily detached or inserted in a cylindrical bore which would maintain a firm and leakproof seat on the bore when in place. I agree with the Solicitor's argument that one seeking to improve a machinery seal would reasonably be expected to investigate not only machinery seals but seals in other arts where similar problems would be encountered. See In re O'Connor, [***20] 34 C.C.P.A. 1005, 161 F.2d 221, 73 USPQ 433.

Claim 10 stands on a somewhat different basis. This claim entirely omits what I think, and have stated above, to be the heart of the application. In substance, claim 10 really amounts to no more than a claim for a hook formation to interlock with the housing of a bore in order to hold a press fit seal in place. n3 Chinnery discloses means to serve the same purpose consisting of screws.

> n3 Chinnery discloses a press fit seal, but no one has suggested that there is anything new about such a device and the specification of the application before us concedes that it is old in the art.

The board conceded that the combination disclosed in claim 10, consisting of spring hooks to fasten a press fit seal to the bore, disclosed novelty over Chinnery but not patentable novelty.

I do not read the opinion of the board as predicating its conclusion of want of invention on the theory that in order to be patentable a combination must have some distinct advantage over the prior art. The board stated that there was nothing in the record to show that the substitution of hooks for screws produced any unexpected result or advantage and, therefore, [***21] concluded that the introduction of hooks did not create patentable novelty, but was a mere substitution of equivalents. The statement that the spring hooks of Ratti were no better than the screws of Chinnery was directed toward this point and seemingly was added to fortify the board's finding of equivalency rather than to propound a theory of patentability. I agree with the board that this claim, though it may show novelty over Chinnery, does not show patentable novelty, and I would affirm its rejection.

LEXSEE 218 USPQ 769

IN RE ROBERT K. GRASSELLI and HARLEY F. HARDMAN, Appellants, and ROHM AND HAAS COMPANY, Intervenor

Appeal No. 83-504

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

713 F.2d 731; 1983 U.S. App. LEXIS 13627; 218 U.S.P.Q. (BNA) 769

July 15, 1983

PRIOR HISTORY: Serial No. 713,024.

DISPOSITION: [**1]

AFFIRMED IN PART and REVERSED IN PART.

CASE SUMMARY:

PROCEDURAL POSTURE: Appellants sought review of a decision of the United States Patent and Trademark Office Board of Appeals that affirmed the final rejections under 35 U.S.C.S. § 103 of claims of appellants' patent reissue application.

OVERVIEW: Appellants filed a patent reissue application. Intervenors filed affidavits purporting to prove obviousness by prior art references. The reissue application claims were rejected under 35 U.S.C.S. § 103, and the board of appeals affirmed. Appellants sought review, arguing that none of the rejected claims would have been prima facie obvious from the prior art and that even if they were, there was rebuttal evidence. According to the court on appeal, all of appellants' evidence should have been considered regarding all the rejections. The court held that rejection was proper as to some of appellants' claims where they were prima facie obvious due to prior art and there was no evidence to overcome the prima facie case. The court further held that rejection was inappropriate as to other claims, which were not proved obvious. The decision upholding the rejection of appellants' claims was affirmed in part and reversed in part.

OUTCOME: The court affirmed the decision upholding the rejection of claims contained in appellants' patent reissue application in part and reversed in part because the rejection was proper as to the claims that were proved obvious based on prior art, but rejection was inappropriate regarding the claims that were not proved obvious.

LexisNexis(R) Headnotes

Patent Law > Nonobviousness > Elements & Tests > Prior Art
Patent Law > Nonobviousness > Elements & Tests > Claimed Invention as a Whole
[HN1] See 35 U.S.C.S. § 103.

Patent Law > U.S. Patent & Trademark Office Proceedings > Appeals
[HN2] See 37 C.F.R. § 1.196(b).

Patent Law > U.S. Patent & Trademark Office Proceedings > Appeals
[HN3] See 37 C.F.R. § 1.196(d).

Patent Law > U.S. Patent & Trademark Office Proceedings > Reexaminations
[HN4] See 37 C.F.R. § 1.198.

Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN5] Rejections under 35 U.S.C.S. § 103 must be based on evidence comprehended by the language of that section.

Patent Law > Nonobviousness > Elements & Tests > General Overview
[HN6] The issue of inherency is a question of fact.

Patent Law > U.S. Patent & Trademark Office Proceedings > Appeals
Patent Law > Jurisdiction & Review > Subject Matter Jurisdiction > Appeals
[HN7] 37 C.F.R. § 1.198 proscriptions, relating to proceedings after a decision by the United States Patent and Trademark Office Board of Appeals (Board), are not relevant to a case remanded to the examiner by the board

under 37 C.F.R. § 1.196(d). Under 37 C.F.R. § 1.196(d), a board decision including a remand is not considered as a final decision in the case. Accordingly, under the express provisions of the rule, the board, after the remand proceedings, shall either adopt its decision as final or render a new decision on all of the claims on appeal. Express Patent and Trademark Office policy interpreting 37 C.F.R. § 1.196(d) suggests that the decision containing the remand is not appealable under 35 U.S.C.S. § 141.

Patent Law > Nonobviousness > Elements & Tests > General Overview

[HN8] Objective evidence of nonobviousness must be commensurate in scope with the claims that the evidence is offered to support.

COUNSEL:

Ford F. Farabow, Jr., of Washington, District of Columbia, argued, for Appellant. With him on the brief was David W. Hill, Herbert D. Knudsen and David J. Untener, of Cleveland, Ohio, of counsel.

Dale H. Hoscheit, of Washington, District of Columbia, argued, for Intervenor. With him on the brief was George W.F. Simmons, of Philadelphia, Pennsylvania, of counsel.

Gerald H. Bjorge, of Arlington, Virginia, argued, for Appellee. With him on the brief were Joseph F. Nakamura, Solicitor and Fred E. McKelvey, Associate Solicitor.

JUDGES:

Bennett, Smith, and Nies, Circuit Judges.

OPINIONBY:

NIES

OPINION:

[*732] NIES, Circuit Judge.

This appeal is from the decision of the United States Patent and Trademark Office (PTO) Board of Appeals (board) affirming the final rejections under 35 U.S.C. § 103 (1976) of claims 1-34, all of the claims of reissue application serial No. 713,024 filed August 9, 1976. We reverse with respect to claims 15 and 19-32 and affirm the board's decision with respect to all other claims.

I

The original patent sought to be reissued here, U.S. Patent No. 3,642,930 (issued on February 15, 1972, to Standard Oil Company, Cleveland, [**2] Ohio), is directed to catalysts containing an alkali metal as an essential catalytic ingredient. As claimed, the catalyst composition must contain, in addition to the alkali metal, bismuth, iron and molybdenum in oxide form. n1 Such alkali metal catalyst compositions are asserted, in the patent, to be an improvement over prior art catalysts in that they are particularly suited to the catalytic oxydehydrogenation of isoamylenes, methyl butanols, or mixtures thereof to isoprene.

n1 In the discussion below, this base catalyst is referred to as a four-component catalyst.

By this reissue application under 35 U.S.C. § 251 (1976), inventors Grasselli and Hardman (hereafter appellants) have presented claims additional to those of the patent: claims directed to catalysts requiring the essential alkali metal component to be potassium, cesium, or rubidium; claims requiring inclusion of preferred additives, and claims requiring activation of the catalyst at 500 degrees F, and up to 1250 degrees F.

Specifically, the subject [**3] application for reissue sets forth claims to a catalyst composition in claims 6-34, and to a process for catalytic isoprene production in claims 1-5. Claims illustrative of that process and catalyst composition are set forth below:

> 1. The process for the conversion of isoamylenes, methyl butanols or mixture thereof to isoprene comprising contacting said isoamylenes, methyl butanols or mixtures thereof with a molecular oxygen-containing gas over a catalyst consisting essentially of an activated catalytic oxide complex described by the following formula:
>
> Bi[a]Fe[b]Mo[c]Q[d]R[e]T[f]M[g]O[x]

---

wherein Q is an alkali metal,
R is an alkaline earth metal,
T is phosphorus, arsenic or antimony,
M is cobalt and/or nickel, and

wherein a, b and c are numbers in the range of 0.1 to 12, d is a number from 0.1 to 8, e is a number from 0 to 8, f is a number from 0 to 6, g is a number from 0 to 12, and x is a number determined by the valence requirements of the other elements present,

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[*733] in a reaction zone maintained at from about 500 degrees F. to about 1100 degrees F. at from about 0.5 to about 10 [**4] atmospheres pressure with a contact time of from about 0.01 second to 50 seconds, and recovering the isoprene.

6. A catalyst composition consisting essentially of an activated catalytic oxide complex of an alkali metal, bismuth, iron and molybdenum as essential catalytic ingredients, and defined by the following formula:

Bi[a]Fe[b]Mo[c]Q[d]R[e]T[f]M[g]O[x]

---

wherein Q is an alkali metal, R is an alkaline earth metal, T is phosphorus, arsenic or antimony, M is cobalt and/or nickel, and
wherein a, b and c are numbers in the range of 0.1 to 12, d is a number from 0.1 to 8, e is a number from 0 to 8, f is a number from 0 to 6, g is a number from 0 to 12, and x is a number determined by the valence requirements of the other elements present.

---

7. The composition of claim 6 wherein Q is potassium.

14. The composition of claim 7 wherein M is cobalt and wherein activation of the catalytic oxide complex is conducted at 500 degrees F to 1250 degrees F in the presence of an atmosphere consisting essentially of air.

15. The composition of claim 6 wherein Q is potassium and M is cobalt, and wherein e equals 0, f equals [**5] 0 and g is a number larger than 0.

17. The composition of claim 7 wherein activation of the catalytic oxide complex is conducted at 500 degrees F in the presence of an atmosphere consisting essentially of air.

19. The composition of claim 6 wherein Q is cesium.

26. The composition of claim 6 wherein Q is rubidium.

As can be seen from the above, the preferred alkali metals, potassium, cesium, and rubidium, are recited in claims 7, 19 and 26. Claims 14 and 17 recite the temperature at which the catalyst compositions can be acti-

vated. Catalyst composition claims, depending from claims 6, 7, 19 and 26, refer to inclusions of optional components expressly recited in claim 6, specifically phosphorus (claims 8, 23 and 30); cobalt (claims 9, 14, 15, 21, 28, 34); nickel (claims 10, 13, 20, 27, 33); mixtures of cobalt and nickel (claim 12); antimony (claims 16, 24, 29) and arsenic (claims 22, 31). Other claims depending from claims 7, 19 and 26 specify that the catalyst is supported on silica (claims 18, 25 and 32).

II

Notwithstanding its expedited case status, the instant reissue application has been pending for seven years. The many issues, considered in this appeal, are in part [**6] attributable to the efforts of Rohm and Haas who vigorously protested this reissue, by appearance during ex parte prosecution, by briefing and oral arguments before the board, and here as an intervenor. n2

n2 The Rohm and Haas motion to intervene here was granted in view of Rohm and Haas's status as a protestor in these reissue proceedings and because the catalyst that Rohm and Haas uses for the oxidation of propylene to acrolein (a catalytic oxidation of an olefin to an unsaturated aldehyde) was accused in an International Trade Commission ("ITC") proceeding of infringing the Grasselli and Hardman catalyst claims. *See Rohm & Haas v. ITC*, 64 C.C.P.A. 170, 554 F.2d 462, 193 U.S.P.Q. (BNA) 693 (1977). The ITC proceedings were terminated at Standard Oil's behest prior to a determination on the merits, following which Standard Oil sought reissue.

These reissue proceedings have twice been appealed to the board. Consequently, two decisions by the board are being reviewed here. As a result of both decisions, there are twelve [**7] separate grounds of rejection of the claims, all under 35 U.S.C. § 103, n3 which were affirmed by the board and are the subject of this appeal.

n3 § 103 provides:

> § 103. Conditions for patentability; non-obvious subject matter
>
> [HN1] A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

[*734] During the first appeal, the board affirmed the examiner's final rejections, based on the following four references which disclose alkali metals, or compounds thereof, in catalysis processes.

Japanese Patent Publication No. 41-11847/1966, June 29, 1966	(Japanese Patent)
U.S. Patent No. 3,205,280 - Wattimena et al.	(U.S. Wattimena)
U.S. Patent No. 3,621,072 - Watanabe et al.	(Watanabe)
U.S. Patent No. 3,415,886 - McClellan	(McClellan)

[**8]

The Japanese Patent Publication No. 41-11847/1966 (Japanese Patent) was cited as a "new ground" of rejection in the examiner's answer in the first appeal to the board as a result of five affidavits, filed by Rohm and Haas, apparently purporting to show that Example 4 of the Japanese Patent produced a product within appellants' claims.

The examiner did not make the additional rejections based on other prior art references as suggested by Rohm and Haas.

However, in the board's first decision, pursuant to its authority under 37 C.F.R § § 1.196(b) and 1.196(d) (Rules 196(b) and 196(d)), n4 the board did entertain Rohm and Haas's suggestions to make those additional rejections on the following references:

U.S. Patent No. 3,226,422 -- Sennewald et al.
U.S. Patent No. 3,346,617 -- Hiroki et al.
U.S. Patent No. 3,414,631 -- Grasselli et al. (Grasselli '631)
U.S. Patent No. 3,454,630 -- Yamaguchi et al.
British Patent 973,565 -- Wattimena et al. (British Patent)

n4 § 1.196(b) provides:

> (b) [HN2] Should the Board of Appeals have knowledge of any grounds not involved in the appeal for rejecting any appealed claim, it may include in the decision a statement to that effect with its reasons for so holding, which statement shall constitute a rejection of the claims. The appellant may submit an appropriate amendment of the claims so rejected or a showing of facts, or both, and have the matter reconsidered by the primary examiner. The statement shall be binding upon the primary examiner unless an amendment or showing of facts not previously of record be made which, in the opinion of the primary examiner, avoids the additional ground for rejection stated in the decision. The appellant may waive such reconsideration before the primary examiner and have the case reconsidered by the Board of Appeals upon the same record before them. Where request for such reconsideration is made the Board of Appeals shall, if necessary, render a new decision which shall include all grounds upon which a patent is refused. The appellant may waive reconsideration by the Board of Appeals and treat the decision, including the added grounds for rejection given by the Board of Appeals, as a final decision in the case.

§ 1.196(d) provides:

> (d) [HN3] Although the Board of Appeals normally will confine its decision to a review of rejections made by the primary examiner, should it have knowledge of any grounds for rejecting any allowed claim that it believes should be considered, it may include in its decision a statement to that effect and remand the case to the primary examiner for consideration thereof. In such event, the Board shall set a period, not less than one month, within which the appellant may submit to the primary examiner an appropriate amendment, or a showing of acts or reasons, or both, in order to avoid the grounds set forth in the statement of the Board of Appeals. If the primary examiner rejects the previously allowed claim or claims on the basis of such statement, the appellant may appeal to the Board of Appeals from the rejection. Whenever a decision of the Board of Appeals includes a remand, that decision shall not be considered as a final decision in the case, but the Board of Appeals shall, upon conclusion of the proceedings before the primary examiner on remand, either adopt its decision as final or render a new decision on all of the claims on appeal, as it may deem appropriate.

[**9]

Specifically, the board's first decision contained a recommendation to the examiner, [*735] in accordance with Rule 196(d), to reconsider the examiner's allowance of certain claims in view of the above references. After remand of the case to the examiner, and during prosecu-

tion before him, various declarations and affidavits were presented by both Rohm and Haas and appellants. Relying on 37 C.F.R. § 1.198, n5 the examiner refused to consider appellants' declarations and affidavits, after having specifically been entered by petition to the Commissioner, on the ground that the experiments therein related only to rejections affirmed by the board in its first decision.

n5 § 1.198 provides:

> [HN4] Cases which have been decided by the Board of Appeals will not be reopened or reconsidered by the primary examiner except under the provisions of § 1.196 without the written authority of the Commissioner, and then only for the consideration of matters not already adjudicated, sufficient cause being shown.

Since [**10] the board's second decision is expressly limited to consideration of the rejections originally proposed by the board under Rules 196(b) and 196(d), the board apparently adopted, at least in part, the examiner's reasoning for refusing to consider appellants' affidavits and declarations filed during the remand period.

As a result of the subsequent prosecution and the board's second decision, all of appellants' claims (original as well as new claims) stand rejected under 35 U.S.C. § 103. Specifically, the following grounds apply:

Claims	References
1-7, 11, 19, 25, 26, 32	U.S. Wattimena
11, 16, 19, 23-26, 29, 30, 32	Watanabe
1-15, 18-21, 23, 25-28, 30, 32-34	McClellan
6, 7, 11-15, 18-21, 25-28, 32-34	Japanese Patent
12-15, 18, 20, 21, 27, 28, 33, 34	U.S. Wattimena taken with the British Patent
16, 24, 29	McClellan taken with Grasselli '631
16, 24, 29	Japanese Patent
6-8, 11, 16, 19, 23-26, 29, 30, 32	Sennewald et al. in combination with Hiroki et al.
5, 9-13, 15-16, 18-34	Yamaguchi et al. or Grasselli '631 taken with Watanabe
17, 22, 31	Sennewald et al. in combination with Hiroki et al.
22, 31	Grasselli '631 in view of Watanabe and appellants' admissions.
17, 22, 31	McClellan in view of Grasselli '631.

[**11]

III

To set the context of the issues here, it is emphasized that all rejections made by the PTO are under 35 U.S.C. § 103. No written description of a catalyst embraced by the appealed claims appears in the prior art applied in the various rejections. *In re Marshall*, 578 F.2d 301, 198 U.S.P.Q. (BNA) 344 (CCPA 1978); *In re Arkley*, 59 C.C.P.A. 804, 455 F.2d 586, 172 U.S.P.Q. (BNA) 524 (CCPA 1972). However, Rohm and Haas put forth a theory of inherency, normally the basis for rejection under 35 U.S.C. § 102, that the board apparently adopted.

In any event, the issues here relate to the determination of obviousness, or nonobviousness, of claims directed to a catalyst composition with four essential components: bismuth, iron, molybdenum and an alkali metal, as well as to claims of a method using that catalyst.

Appellants take the position that none of the rejected claims would have been *prima facie* obvious from the prior art. In essence, appellants argue that catalysis is unpredictable and that the board has equated very different catalysts and very different reactions with those of appellants to support the rejections.

Alternatively, if the claims appear to have been *prima facie* obvious, [**12] appellants argue that rebuttal evidence of record negates this conclusion. Primarily, appellants rely on Friedrich I, Friedrich II, Friedrich III and Friedrich IV declarations, although other declarations (and affidavits) were filed on behalf of appellants corroborating, supporting, or adding to information set forth in the four Friedrich declarations. n6 Specifically, appellants ask this court to [*736] consider, although the board did not, the experiments and evidence of Friedrich III and IV with respect to rejections affirmed by the board in its first decision.

n6 These are by Baldwin, Strecker, Callahan and Grasselli et al. Rohm and Haas, too, has filed various declarations and affidavits. These are by Kennelly, De Jong, Lade, Bauer and Nemec.

IV

The examiner held that appellants' claimed catalyst and method of use would have been obvious on the basis of teachings in any one of the following references: Japanese Patent; U.S. Wattimena, Watanabe, or McClellan. These four references were asserted as [**13] four separate grounds of rejection which were the subject of the first appeal. As the PTO treated these four references as the references most material to the issue of patentability of all of the rejected claims, they will be considered first; for analysis, we find it convenient to discuss them starting with Watanabe.

A

Watanabe (U.S. Patent No. 3,621,072)

Appellants argue, and we agree, that the board erred in holding that any of appellants' claims would have been obvious from the teachings of Watanabe. n7

n7 Although appellants had argued in the first appeal, and do here, that Watanabe "falls short of establishing a *prima facie* case of obviousness," appellants filed a declaration under 37 C.F.R. § 1.131 "in order to simplify the issues on appeal," during the remand period between the first and second appeals to the board. In the board's second decision, the board reversed the rejections of certain claims over Watanabe, finding the declaration sufficient to antedate the reference with respect to those claims. As the Watanabe reference does not establish a prima facie case of obviousness, we need not treat the remaining issues arising under 37 C.F.R. § 1.131.

[**14]

Watanabe describes a catalytic conversion of a mixed gas of isobutylene, methanol and/or ethyl ether to isoprene. The catalyst used by Watanabe is described to be at least one oxide of tungsten, vanadium, molybdenum, uranium, copper, iron, and chromium. Various Watanabe examples employ as the catalyst one oxide of the aforementioned elements; one of the examples employs as a catalyst a mixed oxide system of molybdenum-vanadium-uranium-tungsten.

In the board's view Watanabe is pertinent under 35 U.S.C. § 103 for the sole reason that:

> We note the explicit *suggestion* by these patentees *to add* compounds of *alkali metals such as sodium or potassium* to the catalysts, to increase isoprene selectivity. [Emphasis added.]

Watanabe describes the addition of promoters to the catalyst, to inhibit side reactions and increase product selectivity. These promoters are described to be compounds of phosphorus, sulfur, boron, antimony, bismuth,

tellurium, silver, barium, calcium, magnesium, potassium and sodium. Of the 22 Watanabe examples, 10 describe the use of promoters. None of the specific examples relies on the use of sodium or potassium as a promoter.

The "promoted [**15] catalysts" actually described therein -- oxides of the following systems: uranium-antimony; tungsten-tellurium; molybdenum-phosphorus; molybdenum-sulfur; vanadium-sulfur; molybdenum-bismuth-phosphorus and calcium-bismuth-molybdenum-phosphorus -- differ significantly from the subject compositions. Even if sodium or potassium were substituted, in any one of the exemplified "promoted" catalysts, for the identified promoter(s), and were operative therein, any composition thus created is deficient in at least one element of appellants' catalyst and there is no objective basis to add the missing element(s) to create the composition as claimed. Thus, appellants' catalyst composition cannot be held to have been obvious from Watanabe alone.

B

Wattimena (U.S. Patent No. 3,205,280)

U.S. Wattimena describes butene production by dehydrogenating butane in the presence of a halogen, oxygen and a solid catalyst. n8

> n8 Although it appears from the discussion above, in section II, that U.S. Wattimena and the British Patent (British Patent No. 973,565 to Wattimena) are used in two different grounds of rejection, this is not the case. The examiner and the board treated the British Patent to be cumulative to U.S. Wattimena. For purposes here, we will agree with the examiner and the board, in a way as adverse to appellants as possible, that the British Patent confirms the intention of U.S. Wattimena to disclose bismuth as a potential catalytic component.

[**16]

[*737] According to U.S. Wattimena, the solid catalyst must contain "one or more alkali metal and/or alkaline-earth metal compounds"; and the preferred catalysts are reported to be those composed of potassium bromide, silver bromide and didymium chloride, on a support. U.S. Wattimena broadly suggests enhanced activity of the basic catalyst on "addition" of "one or more metal compounds derived from the transition elements of Groups I and IV to VIII of the Periodic Table and/or a rare-earth metal compound," such as the elements: zirconium, titanium, vanadium, chromium, molybdenum, manganese, tungsten, iron, cobalt, nickel, palladium, copper, silver and compounds thereof.

The rejections under 35 U.S.C. § 103 over Wattimena are based on the following description:

> A suitable *solid catalyst (plus carrier)* for the dehydrogenation of butene to butadiene has the following composition (in parts by weight): Al[2] O[3] 90.2; Si O[2] 9.0; Fe[2] O[3] 0.2; Mg O 0.1, Ca O 0.1; Na[2] O 0.1; K[2] O 0.1; and Ti O[2] 0.1. A catalyst which was successfully used in the dehydrogenation of n-butane contained, in addition, 1.7 "didymium oxide." 0.6 Na[2] O, and 1.4 Mo O[3], [**17] the latter compounds as Na-molybdate. In another similar case, the additional compounds consisted of 11.4 Bi[2] O[3] and 7.0 Mo O[3] parts by weight. Excellent results were also obtained with a solid catalyst consisting of 100 Si O[2]; 19.9 "didymium 17.1 Mo O[2] and 3.7 Na[2] O parts by weight.

U.S. Wattimena, col. 4, lines 38-49 (emphasis added).

As framed by the parties, the issue posed by Wattimena resides in an *interpretation* of the description of the first composition of eight components (Al[2] O[3], Si O[2], Fe[2] O[3], Mg O, Ca O, Na[2] O, K[2] O and Ti O[2]), particularly in light of the language "solid catalyst (plus carrier)." Two extremely divergent views in interpreting this description have been argued.

On the one hand, it is argued that appellants' catalyst, for example as in claim 6, would have been obvious from the *whole* of the above excerpt from Wattimena inasmuch as the four components of appellants' catalyst would be found together if Bi[2] O[3] and Mo O[3] are added as suggested in the third sentence of the above excerpt, (albeit as a ten-component composition); n9 however, it is noted, the excerpt fails as a [**18] direct anticipation because, *inter alia*, the eight-component composition contains Ti O[2], described as a catalytic component by U.S. Wattimena but not recited in appellants' claims as a catalytic component.

> n9 Declarations filed by Friedrich (Friedrich I) and Strecker on appellants' behalf have been considered. These declarations attempt to show that the written description fails to produce appellants' catalyst and pertains to X-ray study comparisons of the eight-component composition, described in Wattimena, excerpted above, and of

the composition resulting from the addition of Bi[2] O[3] and Mo O[3] to that eight-component composition. These declarations are not considered to be dispositive of the issue attempted to be proven, as there is, *inter alia*, no X-ray study of a four-component catalyst, of, for example, appealed claim 6, in the study.

On the other hand, appellants argue that the eight-component composition described in the excerpt above must be construed as constituting a *carrier* [**19] . To buttress this argument, appellants rely on information in brochures, as well as other evidence in the record of this appeal, which shows that Norton alpha aluminas (catalyst carriers) comprise each of the eight components (Al[2] O[3], Si O[2], Fe[2] O[3], Mg O, Ca O, Na[2] O, K[2] O and Ti O[2]) in substantially similar, though not identical, proportions to the eight-component composition in the Wattimena description excerpted above and relied upon by the [*738] PTO in the rejections under 35 U.S.C. § 103. n10

n10 The evidence, brochures and other information, includes an April 4, 1977, letter from James D. Ball of Norton Company Chemical Process Products Division; a typical chemical analysis of the SA-5105 (SA-105) catalyst carrier, a Norton alpha-alumina; Bulletin CC-10 entitled "Catalyst Carrier," (1974); a chemical analysis sheet for SA-5205, augmenting information in Bulletin CC-10; and a comparison of the old product, the then current (1977) product and the product sent to Standard Oil Company.

The Baldwin declaration confirms the fact that Norton alpha aluminas (for example, Norton SA 105) predate the application filing date of the original patent sought to be reissued; none of the arguments here dispute that fact.

[**20]

In our view, the effect of this information concerning the composition of the Norton alpha-alumina carrier is not to interpret what was intended by Wattimena's description, but to shift the burden of going forward to the PTO. It then became incumbent on the PTO to show that Wattimena itself would suggest adding two components and selecting out at least the four essential components of appellants' catalyst, or that there was some reasonable basis in the prior art to make the selection claimed here. *See In re Sasse*, 629 F.2d 675, 681, 207 U.S.P.Q. (BNA) 107, 111-12 (CCPA 1980). The PTO failed to counter appellants' showing and, accordingly, we do not sustain claim rejections based on U.S. Wattimena.

C

The Japanese Patent Publication 41-11847 (Japanese Patent)

The Japanese Patent is directed to improving the selectivity of a known process for producing propylene oxide (the epoxide) by decreasing isomerization reactions which result in the by-product propionaldehyde. This improvement is achieved by modification of process conditions but does not rely on use of any particular catalyst system.

In fact, the Japanese Patent suggests no criticality as to the catalyst composition: That is, [**21] the Japanese Patent indicates that any "metal and/or metallic oxide system" based on "copper, silver, molybdenum, bismuth, vanadium, antimony, tungsten, cobalt, nickel, manganese, chromium, tin, selenium, or iron" may constitute the catalyst. Catalysts used in Examples 1-3 and 5-12 vary widely in composition, for example, from silver or silver oxide alone to systems including copper, tin, and selenium.

The contribution of the Japanese Patent, the modification of the propylene oxide production process conditions to improve selectivity, requires both *inclusion of a peroxide* or a peroxide source in the feed stream of propylene and oxygen *and* addition of a *basic organic or inorganic substance* (hereinafter "basic modifier") to an "ordinary" oxidation catalyst of a metal and/or metallic oxide system. The basic modifier is broadly described as organic or inorganic, solid or liquid, either a strong base or a weak base. In the examples, triethanol amine, 2,3,4-trimethyl pyridine, sodium carbonate, sodium hydroxide and potassium hydroxide are used as the source of the basic modifier. n11

n11 Significantly, the Japanese Patent does not describe "alkali metal(s)" either in conjunction with the description of the catalyst or in conjunction with the basic modifier.

[**22]

Within the confines of the patent, a number of examples of the improved process are given. But for Example 4 the entire disclosure is otherwise of no interest.

In Example 4, the first stage in the process requires admixing potassium hydroxide (as the source of the modifier) with stearic acid containing a calcined mixture of the salts of bismuth, iron and molybdenum. The pertinent portion of Example 4 reads:

Example 4:

> 110 gm of ammonium molybdate was dissolved in 150 cc of hot water. Separately a dispersion of 150 gm of bismuth nitrate and 50 gm of ferric nitrate in 100 cc of 1N nitric acid solution was prepared. The solutions were mixed to form a milky brown precipitate. The precipitate was dried at 110 degrees C, crushed, 1% by weight of stearic acid added and molded to circular tablets 5 mm diameter X 5 mm, then calcined at 400 degrees C for 16 hours. The catalyst [*739] thus obtained is referred [to] as Catalyst-C (comparative example).
>
> 15 cc of 1N potassium hydroxide solution was added to the Catalyst C and the product obtained by drying it at 120 degrees C is referred [to] as Catalyst D (example of this invention).

It is apparent that no written description [**23] of the claimed compositions is given in Japanese Patent Example 4 and the board refused to hold the Japanese Patent to be a direct anticipation. *In re Arkley*, 59 C.C.P.A. 804, 455 F.2d 586, 172 U.S.P.Q. (BNA) 524 (CCPA 1972). Without explanatory comment, the board, nevertheless, adopted the examiner's reasons for affirmance of the § 103 rejections based *not* on any interpretation of the *prior art* embodied by the Japanese Patent, but on extraneous evidence in the form of affidavits filed by Rohm and Haas during the examination of the subject reissue application in support of its assertion that appellants' catalyst was anticipated by Japanese Patent Example 4, a position it urged before the board.

It is fundamental that [HN5] rejections under 35 U.S.C. § 103 must be based on evidence comprehended by the language of that section. *In re McKellin*, 529 F.2d 1324, 1329, 188 U.S.P.Q. (BNA) 428, 433 (CCPA 1976). We consider the affidavits not because of their competency as prior art but rather because of the *inferences of inherency* which underlie the PTO's § 103 rejections based on the Japanese Patent and which are not consistent with the description of the Japanese Patent, set forth above. If [**24] the affidavits fail to show that Japanese Patent Example 4 produces a composition within the rejected claims, *a fortiori*, they evidence nothing relevant to the patentability of the rejected claims.

Inherency would be established either if the portion of Example 4 excerpted above produces the four-component catalyst; or if the Example 4 catalyst is converted to the four-component catalyst when it is subjected to temperatures of propylene oxide production described in other portions of Example 4.

[HN6] The issue of inherency is a question of fact. *In re Fracalossi*, 681 F.2d 792, 794, 215 U.S.P.Q. (BNA) 569, 571 (CCPA 1982). Five affidavits, apparently presented by Rohm and Haas to support the above two arguments, fail to establish such critical facts. The affidavits state that a reaction product is formed (by a test with pH paper) when the potassium hydroxide is added to the stearic acid containing the calcined mixture of salts of bismuth, iron, and molybdenum when the synthesis of Japanese Patent Example 4 is followed, and that the potassium content of that reaction product remains substantially constant, whether it is merely dried at 120 degrees F or subsequently heated at 340 degrees C, [**25] or heated to 427 degrees C, and then to 538 degrees C. However, there is no evidence that that reaction product is one embraced by claims 6 and 7. Specifically, there is no evidence of record which shows that that reaction product includes potassium in the potassium oxide form. n12 If appellants' catalyst is inherent in the Japanese Patent, it has not been established by the record here and obviousness cannot be predicated on that which is unknown. Thus, we reverse the board's rejection on the Japanese Patent.

> n12 Moreover, the evidence in Friedrich II and Friedrich III comparing the catalyst of the Japanese Patent Example 4 to appellants' four-component catalyst, containing potassium as the essential alkali metal, shows that under certain catalytic reaction conditions the activity of appellants' four-component catalyst differs substantially from that produced by the Japanese Patent Example 4 and that activity is independent of amounts of potassium hydroxide used.

D

McClellan, U.S. Patent No. 3,415,886 [**26]

McClellan, U.S. Patent No. 3,415,886, is directed to bismuth molybdate-, or phospho-bismuth molybdate-(bismuth molybdate), on silica catalysts heat treated to temperatures of 750 degrees to 850 degrees C to convert crystalline bismuth molybdate to an amorphous phase. Heat treatment to achieve this result may be undertaken in two stages, first at a temperature of 400 to 500 degrees C and then at a [*740] temperature of 750 to 850 degrees C. These catalysts are described to be useful in oxidative dehydrogenation, in propylene ammoxidation and isoprene production.

The significance of McClellan resides in its additional descriptions, relating to the presence of alkali

metal in the catalyst and to the enhancement of catalytic activity by inclusion of promoters such as iron. Appellants argue, however, that McClellan actually teaches away from inclusion of alkali metal in the catalyst and, that as to promoters, McClellan contains merely a "shotgun" description of many elements for such use, which would not lead a person of ordinary skill to select the elements appellants require.

With respect to alkali metal inclusion, McClellan suggests that sodium and/or potassium may *contaminate* [**27] the McClellan heat treated catalyst if reactants containing sodium or potassium are employed, as a source of the molybdate, or if the silica sol used as the essential silica carrier contains either or both:

> Molybdenum oxide is usually obtained from aqueous ammonium molybdate; however, alkali molybdates can be used. When alkali molybdates such as sodium or potassium molybdate are used, sodium or potassium ion, which is difficult to eliminate completely, must be acceptable in the final catalyst. An atomic Na:Mo ratio of 1:4 must not be exceeded in order to maintain good directivity in the catalyst. After processing in the manner described in this invention, heat-treated compositions containing sodium or other alkali or alkaline earth metals in the acceptable metal/molybdenum ratio of 1:4 or less give X-ray evidence of the presence of the scheelite structure of crystalline Mx[1]/[x]BiMo[2]O[3], where x = valence of alkaline earth or alkali metal M. In view of the desirability of low sodium and potassium content in most catalysts, ammonium molybdate is a preferred source of the molybdenum component of the catalyst.
>
> * * *
>
> The catalyst of the invention involves use of silica [**28] as a support, and the silica must be added as colloidal silica, i.e., an aqueous silica sol (silica sols generally contain about 30-40% silica). The silica can be present in the final catalyst in any amount less than 90% and greater than 5%, but it is preferred that the catalyst contain about 27-75% by weight of silica. Certain commercial silica sols contain small amounts of sodium (e.g., one commercially available product of 30% SiO[2] content contains 0.3% Na[2]O as titratable alkali), but, as previously discussed, low levels of sodium appear to have no serious effect on the catalysts of this invention. When these commercial silica sols are used, the catalytic composition can have the following formula:
>
> Bi[a]P[b]Mo[12]Si[c]O[d]Na[e]
>
> Where a is 4, b is 0 to 2, c is 24 to 160, d is 1.5a + 2.5b + 36 + 2c + 0.5e and e is 0 to 3.

McClellan, col. 3, lines 1-65.

Although McClellan does indicate that sodium and/or potassium can adversely affect the "directivity" of catalysts, as well as methods for insuring the absence of alkali metal, McClellan's catalyst will tolerate sodium and/or potassium contamination to a specified extent. Moreover, Example 1 of the reference [**29] describes, as a result of McClellan's heat treatment (at 750 degrees C), an amorphous scheelite NaBiMo[2]O[8] catalyst. n13 McClellan describes sodium or potassium in a bismuth molybdate catalyst and the efficacy [*741] of the resulting composition for its intended use as a catalyst. The only missing ingredient is iron which, however, McClellan supplies.

> n13 Appellants argue that the language "activated catalytic oxide complex" in claims 1 and 6 and the language in claims 17 and 14 specifying temperatures of 500 degrees F and 500 to 1250 degrees F, respectively, as temperature of catalyst activation, serve as patentable distinction over McClellan which requires an ultimate calcination temperature of 750 degrees-850 degrees C. However, McClellan does indicate that the first stage of a two-stage calcination treatment may be undertaken at lower temperatures, 400 degrees to 500 degrees C, which can produce a catalyst, though a conventional one, and not McClellan's amorphous catalyst resulting from higher heat treatment, i.e., 750 degrees to 850 degrees C. McClellan does not state that sodium or potassium contamination of bismuth molybdate will not occur at 400-500 degrees C.

[**30]

To enhance catalytic activity, McClellan enumerates iron, nickel, or cobalt, as well as various other elements, as promoters. Appellants argue that many elements are enumerated as promoters and that no specific promoted *catalyst* is described in McClellan. However, McClellan specifically indicates that addition of the promoters, iron,

for example, (as well as "cobalt and nickel," recited in other claims) will enhance catalytic activity. Moreover, McClellan specifically describes how to apply these promoters:

> These promoters are usually applied by impregnation or surface coating of already formed bismuth molybdate of phosphomolybdate-on-silica catalysts. Thus, the metals can be added to the slurried catalyst as a salt or acid or the metal, e.g., as a compound which is thermally decomposable in situ to form the desired promoter. After the catalyst has been impregnated with such solutions, employed in concentrations adequate to provide the desired amount of material, the impregnated catalyst may be dried and calcined *at any desired temperature.*

McClellan, col. 5, lines 2-11 (emphasis added).

The descriptions of McClellan directed to adding iron, nickel and cobalt [**31] as promoters, how to make that addition, and the effect of that addition, once made, suggest a predictably operative result, a successful addition of those elements to McClellan's catalyst. *In re Mercier*, 515 F.2d 1161, 185 U.S.P.Q. (BNA) 774 (CCPA 1975).

In view of the McClellan description concerning the addition of *iron* as a promoter and the express statement concerning the tolerance of McClellan catalysts to limited amounts of sodium and potassium ion, we agree with the board that appellants' claimed catalyst composition of these four elements and claimed method would have been *prima facie* obvious from McClellan and in the absence of evidence to overcome this *prima facie* case the rejections of claims 1-15, 18, 33 and 34 must be affirmed.

However, we do not agree that McClellan also renders obvious appellants' catalysts containing cesium or rubidium as the essential alkali metal (appealed claims 19 and 26, and claims depending therefrom). Without express comment, the board apparently tacitly adopted the examiner's reasons for rejection:

> No *patentable distinction* was seen *in the claimed use of* cesium or rubidium rather than the sodium or potassium components [**32] taught by the patent. [Emphasis added.]

The reference to "patentable distinction," begs the inquiry under 35 U.S.C. § 103. *Graham v. John Deere Co.*, 383 U.S. 1, 15 L. Ed. 2d 545, 86 S. Ct. 684 (1966).

The only possible basis for rejecting appellants' catalyst composition claims requiring cesium or rubidium, not expressly described in McClellan, is the implicit assumption that the McClellan language "alkali metal" makes all elements of Group IA of the Periodic Table, lithium, sodium, potassium, rubidium, cesium and francium, equivalents for *modifying* bismuth molybdate *catalysts*. However, the known relationship of lithium, cesium, rubidium and francium to sodium and potassium, as Group IA elements, is not sufficient, in and of itself, to treat them as *interchangeable* in *catalyst* compositions. *In re Doumani*, 47 C.C.P.A. 1120, 281 F.2d 215, 217, 126 U.S.P.Q. (BNA) 408, 410 (CCPA 1960).

Moreover, there is no description in McClellan which suggests the equivalency inferred by the PTO. The language "alkali metal" as used in McClellan relates to practical sources of contamination of the bismuth molybdate catalyst, by sodium or potassium salts of the *molybdate* [**33] *source* or by sodium in the carrier. In view of the lack of description in McClellan, or in any other art or record here, of cesium and/or rubidium reactants or catalytic components, McClellan's caveat concerning the effect of alkali metal contamination of catalysts, and the express limit on the amount of alkali metal tolerated by McClellan heat-treated catalysts, we conclude that the efficacy of [*742] the cesium- and rubidium-containing compositions as catalysts in claims 19-32 could only be derived from scrutiny of appellants' specification. Accordingly, the rejections of claims 19-21, 23, 25-28, and 30 are reversed.

V

Turning to the issue of whether appellants have overcome the *prima facie* case of obviousness of claims 1-15, 18, 33 and 34 based on McClellan, we are faced with the question of what evidence must be considered. Appellants ask this court to consider all evidence in Friedrich I, II, III, and IV, as well as all other affidavit and declaration evidence of record. Appellants assert that the board erred in refusing to consider Friedrich III with respect to rejections based on McClellan alone. Friedrich III and Friedrich IV present rebuttal evidence relating [**34] to McClellan, as well as information and experiments responding to the board's criticisms of Friedrich II experiments relating to the Japanese patent.

Friedrich III and Friedrich IV, filed during the remand period after the first board decision, in which the rejections based on McClellan alone were affirmed, but before the second appeal, were ultimately entered as evidence by the Commissioner on equitable grounds, although the Commissioner acknowledged the examiner's

reasons for refusing to enter the declarations; evidence therein related only to rejections already affirmed by the board in the first decisions. n14 The examiner refused to consider the rebuttal evidence in Friedrich III and IV as it pertained to the rejections which were the subject of the first appeal, even after entry of the two declarations by the Commissioner, for the following reason:

> Rule 198, however, does not authorize the Primary Examiner to consider matters already adjudicated, which Friedrich 111 [sic] declaration clearly attempts to force.

The board apparently adopted the examiner's reason without comment and expressly limited its second decision to consideration of the new rejections. [**35]

> n14 In granting appellants' petition from the examiner's refusal to enter Friedrich III and IV declarations, the Commissioner stated:
>
> > [1] It would be inequitable to deny applicants, who are the real parties of interest, as much right to participation and evidentiary showings [in Friedrich III and Friedrich IV] in their own reissue application as has already been accorded on the record to Protestor [by *de facto* entry and consideration of Rohm's declaration by Nemec, criticizing Friedrich III].
> >
> > * * *
> >
> > [2] It is noted that applicants, by virtue of filing a continuation reissue application, could formally introduce said declarations into the record, but with concomitant delays in ultimate resolution of the issues. It does not appear that such delay would serve any useful purpose. Furthermore, reference is again made to the already lengthy prosecution history of the instant case and the deferral of enforcement of the original patent as noted in Paper No. 89. Therefore, in view of the equities involved and in order to expedite the resolution of the issues in this case. . . . *The Primary Examiner is hereby directed to proceed* with dispatch as indicated in Paper No. 89 with the examination of the instant case including considering the Friedrich III and IV affidavits for their probative value and merit. [Emphasis added.]

[**36]

Rule 198 [HN7] proscriptions, relating to proceedings after the board's decision, are not relevant to a case remanded, as here, to the examiner by the board under Rule 196(d). Under Rule 196(d), a board decision including a remand is "not . . . considered as a final decision in the case." Accordingly, under the express provisions of the rule, the board, after the remand proceedings, "shall . . . either adopt its decision as final *or* render a new decision on all of the claims on appeal." (Emphasis added.) Express PTO policy interpreting Rule 196(d) suggests that the decision containing the remand is not appealable under 35 U.S.C. § 141. Manual of Patent Examining Procedure, § 1213.04 (Oct. 8, 1981). Thus, it was error to apply Rule 198 in this instance.

All evidence presented by appellants should have been considered in connection with all rejections, and in view of the inordinate delays in these proceedings, we will proceed to do so.

Of most significance is the evidence in Friedrich III. By Friedrich III appellants sought to establish that appellants' four-component [*743] catalyst unexpectedly outperforms the composition of McClellan's Example 1 (modified to contain iron as [**37] a promoter). The experiment was made on the basis of appellant's catalyst containing sodium as the essential alkali metal component and activated at a temperature between 500 degrees and 1250 degrees F, in ammoxidation after 20 hours on stream to make acrylonitrile.

Initially, it is noted that appellants' process claims 1-5 are directed to isoprene production. Thus, the above comparison "in ammoxidation" is of no help with respect to overcoming the rejections of claims 1-5 and appellants do not so assert.

It is well settled "that [HN8] objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support." *In re Tiffin*, 58 C.C.P.A. 1420, 448 F.2d 791, 171 U.S.P.Q. (BNA) 294 (CCPA 1971). With respect to appellants' broad claims to a catalyst with "an alkali metal," the experiments detailed in Friedrich III, being limited to sodium only, are not commensurate in scope, and are, therefore, insufficient to rebut the prima facie case. No

claim is directed to sodium as the essential alkali metal component. n15 Accordingly, the rejections based on McClellan alone have not been overcome notwithstanding the evidence in Friedrich III.

> n15 We have considered, and dismiss, intervenor's criticisms of the reproduction of the McClellan catalyst in Friedrich III. The ultimate unsupportable extension of the Rohm and Haas position is that appellants should modify McClellan descriptions to make a "composite" which is appellants' invention. *See* discussion in *In re Tiffin*, 58 C.C.P.A. 1277, 443 F.2d 394, 399-400, 170 U.S.P.Q. (BNA) 88, 93 (CCPA 1971), *modified* (as to claims 1-3 and 10-16) 58 C.C.P.A. 1420, 448 F.2d 791, 171 U.S.P.Q. (BNA) 294 (CCPA 1971). Firstly, it was argued that the McClellan promoter should have been added prior to McClellan's critical calcination stage undertaken at 750 degrees to 850 degrees C. However, McClellan describes (in the generic teaching and in Example 1) undertaking catalyst calcination in two stages, the last stage at 750-850 degrees C; and then describes calcination of the catalyst impregnated with promoter "at *any* desired temperature" (emphasis added). Accordingly, McClellan suggests three calcination stages. The lack of criticality in McClellan's own description of the temperature of the calcination of catalyst impregnated with promoter can hardly be construed to require a temperature of 750-850 degrees C. Secondly, appellants are criticized for comparison of the two catalysts in ammoxidation; since McClellan expressly discloses use of McClellan catalysts in ammoxidation, an ammoxidation process is a reasonable reaction choice for comparative catalytic activity studies as to catalyst composition claims. Thirdly, intervenor criticizes the comparisons on the grounds that the compared catalysts selectivities are similar. This criticism would only have validity if the catalyst activity and resultant yields were similar, which is not the case here.

[**38]

However, the evidence in Table II of Friedrich II, rebuts any case of *prima facie* obviousness of claim 15. Claim 15 defines appellants' catalyst to be a composition of potassium, iron, bismuth, molybdenum, and cobalt. In Table II of Friedrich II, appellants have shown that a catalyst of claim 15 results in a percentage improvement (in yield) of 94% over their own catalyst of claims 6 and 7, containing potassium, iron, bismuth, and molybdenum (exclusive of cobalt) in acrolein production at 400 degrees C, while at 310 degrees C, the percentage improvement is even greater, 479%. In evaluating this evidence, we have noted that actual acrolein yields increase with increasing temperature.

None of the prior art reviewed here, including McClellan, describes a catalyst more similar to that of claim 15 than those described in appellants' claims 6 or 7. Accordingly, that comparison in Table II of Friedrich II which shows that the claim 15 catalyst outperformed the others (i.e., claims 6 and 7) is evidence of unexpected superiority. This comparison, and the conclusion based thereon, is the ultimate extension of the "indirect showing of unexpected superiority" sanctioned by precedent. [**39] *In re Fenn*, 639 F.2d 762, 208 U.S.P.Q. (BNA) 470, 473 (CCPA 1981); *In re Fouche*, 58 C.C.P.A. 1086, 439 F.2d 1237, 1241-42, 169 U.S.P.Q. (BNA) 429, 433 (CCPA 1971). Accordingly, the rejection of claim 15 based on McClellan is reversed.

VI

The remainder of the rejections are those instituted by the board, pursuant to Rules 196(b) and 196(d). The grounds of rejections in the claim rejections are based on combinations of references. The grounds [*744] for the section 103 rejections under Rule 196(b) and 196(d) will be considered below, not necessarily in an order relating to the significance of the art to the rejected claims, but rather with respect to the number of claims affected thereby.

A

Rejections Under 35 U.S.C. § 103 Over Hiroki and Sennewald

The examiner refused to entertain the Rohm and Haas suggestion to reject claims over the combination of Sennewald (U.S. Patent No. 3,226,442) and Hiroki (U.S. Patent No. 3,346,617), stating:

> Such a rejection would not be valid because there is insufficient basis for combining the Sennewald and Hiroki patents in the manner suggested.

However, in the board's first decision, the board added rejections of claims 6-8, 11, 16, 19, [**40] 23-26, 29, 30, and 32, over that combination and recommended similar rejections of allowed claims 17, 22, and 31. The board reasoned:

> We must disagree with the Examiner's view that these references are not properly combinable, because both are directed to

> catalytic compositions utilized in the production of methacrylonitrile from isobutylene.

The utility of the two different catalysts of the Sennewald and Hiroki references might suggest, as the board purported, interchangeability of the catalysts. However, the express descriptions of those references which indicate that components of the two catalysts are not interchangeable is material to the validity of the rejection of catalyst composition claims under 35 U.S.C. § 103.

In the board's limited discussion of this ground of rejection, the board concerned itself mainly with Hiroki without commenting on Sennewald, save for the Sennewald description of utility. Hiroki is directed to modifying a bismuth phospho-molybdate catalyst to improve the yields in ammoxidation processes by increasing the alkalinity of the bismuth phospho-molybdate catalyst. In the express words of Hiroki:

> [The bismuth phospho-molybdate catalyst] [**41] is made "more alkaline," either by the addition to the bismuth phospho-molybdate catalyst of an alkali metal or alkaline earth metal, or by the substitution of arsenic and/or antimony for a part or all of phosphorous in the phospho-molybdate composition, or further by the addition to the substantial molybdate of an oxide or hydroxide of an alkali or alkaline earth metal.

Hiroki, col. 2, lines 13-20.

Specifically, Hiroki suggests three, apparently equivalent, ways to increase the alkalinity of bismuth phospho-molybdate catalysts. The board treated those three ways of rendering the phospho-molybdate "more alkaline," as equivalent in making the rejection. This is not error as we find no description in Hiroki to indicate otherwise.

Hiroki was applied in the rejection for its suggestion to add alkali metal to a bismuth phospho-molybdate catalyst. Sennewald, silent with respect to alkali metal content, is combined with Hiroki for the Sennewald disclosure of iron addition to bismuth molybdate and to phospho-molybdate catalysts.

Sennewald characterized the improvements over prior catalysts to be based on the following differences "in the content of iron as an additional catalyst [**42] component and in the omission of such metals as tungsten, antimony and tin." Omission of antimony, as described by Sennewald, is inconsistent with the express object of Hiroki, to render the bismuth phospho-molybdate catalyst "more alkaline" by the addition of antimony and/or arsenic or its equivalent, the addition of alkali metal or alkaline earth metal.

The board's error, in rejecting claims over Hiroki and Sennewald, lies in its failure to recognize the express prohibition against inclusion of antimony in Sennewald's catalysts. In contrast, we have Hiroki's express statement as to interchangeability of alkali metal and antimony with the same beneficial result. Logical inquiry into the express statements of these two references would suggest lack of interchangeability of the [*745] respective catalytic components. Appellants' successful combination of alkali metal, iron, bismuth and molybdenum for a catalyst composition is contrary to these art descriptions.

Accordingly, we agree with the examiner's original conclusion and reverse the rejections under 35 U.S.C. § 103 of claims 6-8, 11, 16-17, 19, 22-26, and 29-32 over Sennewald in combination with Hiroki.

B

Rejections [**43] *of Claims over Watanabe, Together with Other Evidence*

In additional grounds of rejection, Watanabe was combined by the board with two other references, Yamaguchi, U.S. Patent No. 3,454,630, and Grasselli '631. Certain statements made by appellants with respect to Grasselli were treated as admissions, but these statements do not add information in addition to that of Grasselli '631 itself.

Turning to the substance of the rejections, the Watanabe catalyst systems discussed in section IV (composed of at least one oxide of tungsten, vanadium, molybdenum, uranium, copper, iron and chromium) differ significantly from those of Yamaguchi and Grasselli '631, each of which may require in combination, *inter alia*, iron, bismuth and molybdenum, and each of which differs from the other as to essential additional components. Specifically, Yamaguchi catalysts are oxides of iron, bismuth, phosphorus, molybdenum and nickel or cobalt or both nickel and cobalt, while Grasselli '631 embraces as one catalyst system an oxide system of iron, bismuth, molybdenum, and either nickel or a combination of iron and nickel optionally containing phosphorus, antimony, and tin.

Notwithstanding the Watanabe [**44] "suggestion" to use sodium or potassium as a promoter, which is the board's sole reason for reliance on Watanabe, we find no suggestion in Watanabe to look to the description embodied by Yamaguchi or Grasselli '631, or vice-versa, and we find no evidence suggesting interchangeability of Watanabe's catalyst compositions with those required by the other two references. Absent such suggestions, the

description of Watanabe when viewed in terms of catalysts actually exemplified in the 22 examples, provides no reasonable basis for adding Watanabe's sodium or potassium to the combined oxides of iron, bismuth and molybdenum of Yamaguchi and Grasselli '631. In our view, the description of Watanabe, as a whole, would not provide the required reasonable expectation of successful addition of sodium or potassium to catalysts described in the two primary references. *In re Clinton*, 527 F.2d 1226, 188 U.S.P.Q. (BNA) 365, 367 (CCPA 1976); *In re Mercier*, 515 F.2d 1161, 185 U.S.P.Q. (BNA) 774 (CCPA 1975).

C

The Rejections Under Rule 196(b) and (d) of Claims 16, 17, 22, 24, 29 and 31

As noted in section II above, there are five different grounds of rejection of various groupings of these six claims. However, [**45] we find it necessary to discuss only McClellan taken with Grasselli '631, because of the descriptions of the catalysts of the references previously given.

To recapitulate, McClellan describes heat treatment (at 750 degrees to 850 degrees C) of bismuth molybdate, or bismuth phospho-molybdate, catalysts to render the crystalline structure amorphous, for use in oxydehydrogenations. McClellan, it was determined, suggests addition of iron to the basic catalyst. Moreover, it was determined that McClellan describes that those same catalysts will tolerate sodium or potassium ion impurities or contaminants to certain specified extents.

Grasselli '631 is directed to bismuth molybdate catalysts containing, in addition, the oxides of at least two transition metals, one of them being preferably iron, for use in oxydehydrogenations. Grasselli '631 is relied upon by the PTO for its description indicating that a portion of the bismuth in the base composition may be replaced by antimony, tin, copper, or arsenic. Grasselli '631 is silent with respect to the presence of alkali metal and describes a calcination temperature of above 500 degrees F (about 262 degrees C), [*746] which, according to [**46] Grasselli '631 Example 1, may be up to 800 degrees F.

Appealed claim 16 requires the inclusion of antimony in appellants' catalyst containing potassium as the alkali metal. Moreover, appealed claim 16 embraces the inclusion of the second transition metal required by Grasselli '631. On the basis of the record before us, it is our view that a person of ordinary skill would have expected that inclusion of antimony, suggested by Grasselli '631, in the catalyst suggested by McClellan, would produce a composition operative as a catalyst, for example, in oxydehydrogenations.

Appealed claim 17 specifies potassium as the essential alkali metal and activation at 500 degrees F (in air). Appellants argue that the temperature used by McClellan would destroy appellants' "activated catalytic oxide compound." In light of the description in both McClellan and Grasselli '631, more is necessary than appellants' argument with respect to the significance of appellants' temperature recitation. McClellan requires, as appellants point out, conversion of the crystalline composition to an amorphous form at 750-850 degrees C. However, McClellan also indicates that heat treatment at a lower temperature can [**47] produce conventional catalysts, but in crystalline rather than the amorphous form which McClellan requires. The Grasselli '631 description concerning catalyst calcination temperatures is cumulative to McClellan's description concerning the effect of calcination temperature on the crystalline form of the composition. If appellants' catalysts, made at the temperature specified in claim 17, exhibit unobvious properties over that described by McClellan, there is no proof of that fact in this record.

Accordingly, we affirm the rejections of claims 16 and 17 over McClellan in view of Grasselli '631.

However, the rejections of claims 22, 24, 29, and 31 over McClellan and Grasselli '631 are reversed for reasons set forth above. These claims require the essential alkali metal component of appellants' catalyst composition to be cesium or rubidium. As discussed in section IV D, above, McClellan does not describe cesium or rubidium in catalyst compositions; and Grasselli, silent with respect to alkali metals, cannot change that determination. n16

n16 Similarly, neither the Japanese Patent (which describes potassium and sodium salts specifically, and not alkali metal compounds and salts) nor any other art of record describes cesium or rubidium in any catalyst. *See* n. 11, *supra*.

[**48]

Accordingly, the rejections under 35 U.S.C. § 103 of claims 15 and 19-32 are reversed, and rejections of claims 1-14, 16-18, 33 and 34 under 35 U.S.C. § 103 are affirmed.

AFFIRMED IN PART AND REVERSED IN PART.